

rachna program
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women and child health at scale

working paper series

paper3

**enhancing
newborn care**



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Enhancing Newborn Care

Abstract

Background and Interventions

INHP-II promoted a set of simple interventions to influence neonatal outcomes, including antenatal tetanus toxoid, clean delivery and cord care, early and exclusive breastfeeding and thermal care, as well as the identification and intensive home care of the low birth weight and premature babies. Implementation strategies included mainly the strengthening of the Integrated Child Development Services (ICDS) program and the programs of the Health Department, particularly at the frontline and supervisory levels, emphasizing timely home visits and counseling during late pregnancy and immediately at and after childbirth. All interventions were implemented at the full project scale of 78 districts across nine states. This paper describes the results and lessons from this experience.

Methods

Evidence is drawn mainly from state-level estimates of indicators from program baseline and endline surveys, district-level estimates from three rounds of periodic assessments from one district in each of the eight project states and from an evaluation research study conducted in one district to assess the impact of the INHP interventions on neonatal mortality using a non-INHP district for comparison over three years. Since all interventions promoted by INHP were targeted at home deliveries, most of the analysis was focused on infants delivered at home. All estimates presented in the results pertain to INHP-assisted regions within the respective states and districts.

Results and Discussion

There were significant increases in coverage estimates for almost all indicators of antenatal care (tetanus toxoid, antenatal check-ups including weight, abdominal check-up, blood pressure measurement) and newborn care (delayed bath beyond three days, use of all 'five cleans', applying nothing to cord stump at birth, initiation of breastfeeding within two hours, avoidance of pre-lacteal feeds) from the program baseline to the endline, in all states other than Rajasthan. The proportion of families practising all behaviors together – early and exclusive breastfeeding and delayed first bath and applying nothing to the cord stump at birth – increased by 20-50 percentage points in these states. The identification and extra care of LBW/premature babies also appeared to have increased over time in several states, but sample sizes were inadequate to draw definite conclusions. Evidence from periodic assessments occurred mainly after 2003, when INHP interventions began. The newborn evaluation research study reported greater newborn care practices in the intervention district as against the comparison district.

Strong associations were seen at the endline between timely home visits and counseling during crucial periods in late pregnancy and the first few days after birth and the first few days after birth correct newborn care practices such as early breastfeeding. The evaluation research study reported greater newborn care practices in the intervention district as against the comparison district.

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Background

The RACHNA program

The RACHNA program of CARE India included two USAID-supported projects: the second phase of Integrated Nutrition and Health Project (INHP-II), which focused on child health and nutrition, and the *Chayan* Project, which supported interventions for promoting birth spacing and the prevention of transmission of HIV/AIDS among groups at high risk. INHP-II, built upon the lessons and experiences of the first phase, was implemented in 747 Integrated Child Development Services (ICDS) blocks¹ in 78 districts across nine states² from October 2001 to December 2006 to complement the Maternal and Child Health and Nutrition (MCHN) efforts of the ICDS and the Ministry of Health and Family Welfare (MoHFW) programs. To achieve its goal of “sustainable improvements in the nutrition and health status of seven million women and children”, INHP-II adopted a two-track approach – supporting service providers to improve the quality and coverage of MCHN services and systems and engaging communities to support better infant feeding and caring practices and sustain activities for improved maternal and child health and survival. The implementation was facilitated by small program teams of CARE, located at the district, state and national levels, and working closely with the functionaries of the ICDS program and the programs of the MoHFW, and with a range of partners, including local NGOs and Community-Based Organizations (CBOs). The main strategies were strengthening of existing systems, behavior change communication and capacity building. A detailed description of the program can be found in the paper, *Program Description*, in this series.

Neonatal Health and Mortality

Every year, an estimated four million babies around the world die in the first four weeks of life. About 99 percent of these neonatal deaths occur in low and middle income countries, the highest numbers being in south-central Asia, including India, and about half occur at home, mostly without seeking care at any facility. More than a quarter of the world's neonatal deaths take place in India, although India has just a sixth of the world's population. Neonatal deaths had been low on the global agenda, largely due to the assumption that little can be done to prevent neonatal deaths in situations where the bulk of childbirths happen in the home. Much experience has accumulated in the past decade to show that this assumption is misplaced and the perception that only expensive, high-level technology-based and facility-based care can reduce mortality is gradually changing. There is convincing evidence that neonatal mortality can be greatly reduced by community-based interventions delivered through outreach health workers. Several low-cost interventions potentially effective in reducing neonatal mortality in settings with weak health systems and high neonatal mortality are now available (Darmstadt et al, 2005; Bhutta et al, 2005; ICDDR, B, 2006). Numerous efforts are currently ongoing in different parts of the world to find approaches that can convincingly take such interventions to communities and families in different contexts.

¹ A block is an administrative sub-unit of a district, having a population of around 100,000, and often larger. An ICDS block is usually identical to the administrative block, and comprises about 100 *Anganwadi* Centers (AWC). Not all blocks in a district and not all villages and hamlets within a block may be served by the ICDS program. INHP-II was designed to be implemented only in ICDS-served blocks, but did not necessarily cover all ICDS blocks in the districts where it was implemented.

² These include Andhra Pradesh (AP), Bihar (BI), Chhattisgarh (CG), Jharkhand (JH), Madhya Pradesh (MP), Orissa (OR), Rajasthan (RA), Uttar Pradesh (UP) and West Bengal (WB). Since the program was implemented in Bihar only from late 2004 onwards, results presented are only from the other eight states.



To impact infant mortality, INHP-II chose to support a set of interventions that were simple and feasible to implement at large scale, from among available interventions that had the greatest likelihood of preventing neonatal and infant deaths. In targeting neonatal deaths, the project focused predominantly on preventing deaths due to sepsis and premature birth using preventive approaches that could be practiced at the home level (Box 3.1).

Box 3.1 Interventions promoted and supported by INHP-II to reduce neonatal mortality:

- Tetanus toxoid immunization for mothers
- Clean delivery
- Cord care
- Adequate thermal care (warmth)
- Early and exclusive breastfeeding
- Early recognition of and extra care for the weak (premature/LBW) newborn.

The supported interventions did not include the management of neonatal pneumonia or sepsis and the management of asphyxia. Although referral of sick neonates to facilities was promoted, appropriate facilities for this purpose were not available in most project areas.

All the supported interventions were already a part of the RCH program of the Government of India, and implicitly a part of the ICDS program, with its mandate of reducing child mortality. In effect, INHP-II attempted to strengthen the efforts of RCH and ICDS in implementing these interventions. The main thrust of the program was to influence home-level neonatal care practices practiced by families. The approach was therefore to try and ensure that information and support for appropriate antenatal and neonatal care was provided to families in a timely manner through home contacts by service providers and volunteers (primarily, *Anganwadi Worker (AWW)* and *Auxillary Nurse Midwife (ANM)*, with *Change Agents* contributing where available). *Dais (TBAs)* were also involved to a limited extent. Intervention approaches in INHP-II also included mobilization of community groups such as women's groups. However, this was not uniform across the program, and no evidence is available to link such approaches with results.

The role of CARE/RACHNA/INHP-II was facilitative, akin to a catalyst. Systemic and community interventions outlined above were supported by full-time project staff at state and district levels, mostly non-medical professionals with managerial and organizational skills, in a proportion of about 1-3 staff per district, often with the help of a small number of staff from contracted local NGOs. The operational focus in INHP-II was mainly at the sector and block (sub-district) levels.

This paper presents results and lessons from INHP-II related to efforts to improve, at scale, newborn care practices and outcomes at the household and outreach levels. Other papers in this series describe the project background, methods of assessment and results and lessons related to thrust areas other than newborn care in greater detail.

Methods of Assessment

Evidence used in this paper comes mainly from a number of large sample surveys conducted over the life of the program for monitoring and evaluation purposes. This section describes the methodology of these surveys in brief.

Baseline and Endline Surveys

Baseline and endline surveys of INHP-II provided state-level estimates for selected indicators. The endline survey of INHP-I (early 2001) served as the baseline survey of INHP-II. The INHP-I endline for Bihar served as the baseline for Jharkhand and the Madhya Pradesh endline served as the baseline for both Madhya Pradesh and Chhattisgarh, since the new states of Chhattisgarh and Jharkhand were created from a division of the erstwhile Madhya Pradesh and Bihar respectively, just prior to the INHP endline survey.

INHP-I consisted of three kinds of program areas based on intensity of interventions and effort: the “High Impact” blocks, “Capacity Building blocks” and “Other blocks”. The 2001 survey was designed to generate separate estimates of these three areas through a multi-stage sampling design: a fixed number of blocks and PSUs (AWCs - *Anganwadi* Centers of ICDS) were randomly picked from each of the three areas; 540, 540 and 832 respondents (mothers of children 0-23 months old) were selected from these arms, respectively using a predetermined random selection process. The interview tool was common to all mothers of children 0-23 months, and covered all interventions supported by INHP – antenatal, natal and newborn care, infant feeding and immunization. State-level estimates, derived by applying population weights to the three areas, are used for all comparisons with the endline, without reference to the three kinds of program areas.

The endline survey of INHP-II (early 2006) used a multistage sampling design, but this differed in some respect from the baseline. The respondents (mothers of children 0-23 month old), were drawn from two groups. The mothers of children 0-5 months of age were asked questions related mainly to antenatal, natal and newborn care and breastfeeding, while mothers of children 6-23 months old were interviewed with questions related mainly to complementary feeding and immunization. This helped minimize recall bias and capture more recent events, likely to have been influenced by program interventions. The sample size for each group was sufficient to detect a 10 percentage point difference in an estimate with 95 percent confidence levels and 80 percent power, and an assumed maximum design effect of 1.8. The number of PSUs and blocks selected in each state varied according to the birth rates, being higher in states with lower birth rates. Blocks were selected in a manner that ensured proportionate representation of urban, rural and tribal blocks, and PSU selection within a block ensured the proportionate representation of demonstration sites (DS),³ replication sites and

³ As described in the paper, *Program Description*, a Demonstration Site (DS) was an AWC that held an NHD every month, had a community group that managed nutrition and health activities, had at least three active Change Agents and had other need-based innovations. The DS were largely supported by local NGOs, and served to demonstrate how these “best practices” were to be implemented, thus facilitating their replication to the rest of the district. The AWCs beyond DS that were reached by end-2004 were termed Replication Sites (RS) and the rest as “Others”, in order to provide a sense of the duration of RACHNA interventions in different AWC.

other sites. Sampling frames were generated for children 0-5 months and 6-23 months old by prior house-listing and the target sample picked by circular systematic sampling, making allowance for a non-response rate of 15 percent. For each group, the target number to be completely interviewed was 733. Effectively, this resulted in a virtual self-weighted sample for each state.

There were changes in the extent of the program universe between the baseline and the endline, arising from factors unrelated to program interventions. Upon the advice of a Technical Advisory Group (TAG) that guided the endline survey, a comparison was made between background characteristics of the two universes, using available census data. Since only minor differences were found between the universes, the TAG recommended that comparisons between the baseline and endline universes should be considered valid. More details about the two universes can be found in the paper, *Methods used for Assessments*, in this series.

Periodic Rapid Assessments (RAPs) in the Panel Districts

In order to monitor progress in outcomes to inform program strategies, a panel of one district from each of the eight states was established in 2003, where three rounds of periodic assessments were conducted between 2003 and 2005 at approximately annual intervals. The universe for these assessments was the first phase replication sites (the first batch of 25 percent AWCs in the district where at-scale implementation began).

Mothers of children 0-5 months of age were interviewed on antenatal, natal and newborn care and breastfeeding, while mothers of children 6-23 months old were interviewed on complementary feeding and immunization. Round 1 had a two-stage design, first randomly selecting five blocks from each district, and then five PSUs from each block, followed by selecting a fixed number of children 0-23 months old from each PSU, whose mothers were respondents. The target sample size was 150 for children 0-5 months old and 450 for children 6-23 months old. Rounds 2 and 3 used a one-stage design, directly picking 90 PSUs from the universe, spread across all blocks in the district, and then randomly selecting the target sample (460 each for the two age groups: 0-5 and 6-23 months) from a sampling frame generated by house-listing after allowing for a 15 percent non-response. The latter samples were sufficient to detect a difference of 10 percentage points in estimates of two surveys with 95 percent significance and 80 percent power, assuming a small design effect. The estimates from the first round were therefore expected to be less precise than those for the subsequent rounds, particularly for the smaller sample of the 0-5 month group. The tools used in Round 1 were modified to add more questions and refine existing ones, while ensuring maximum comparability.

The Newborn Evaluation Research

A newborn evaluation research (NER) study was conducted by the Johns Hopkins Bloomberg School of Public Health, to assess the impact of the INHP intervention package when implemented at scale, on neonatal mortality, using a quasi-experimental design. The study covered one program district, Barabanki in Uttar Pradesh, using non-RACHNA ICDS sites in Unnao district for comparison, and lasted about 30 months. The baseline survey was conducted in mid-2003 and the endline survey was contemporaneous with the RACHNA program endline survey in

early 2006. Two smaller “adequacy” surveys were conducted at intervals between the baseline and endline surveys. This study was the only source of neonatal and infant mortality data in INHP.

More detail of these surveys and related information is available from the paper *Methods Used for Assessments used in the RACHNA program*, in this series.

In all surveys, for all antenatal and newborn care practices assessed at the household level, data for mothers having a child up to six months of age has been used in order to minimize recall bias about perinatal events. This pattern was followed even for the Evaluation Research study, although data is available for a longer period of recall from these surveys. The use of a narrow age group also helps detect more recent change, which is helpful in understanding the effects of interventions that were rapidly scaled up over the last three years of program life, and hence were expected to produce greater effects later in the course of the intervention. Since the program interventions focused on home based care for newborns, and it did not involve interventions for improving institutional care of the newborn, analysis is largely limited to those children born at home. Home births constitute the bulk of all births in most states, so the effect on sample size is small except in Andhra Pradesh and West Bengal, where larger proportions of births were institutional. For a few selected indicators, hospital births were separately analyzed, particularly in the Andhra Pradesh and West Bengal contexts.

With implementation and assessment experience, more refined and specific indicators were introduced. Thus the endline survey has far more detailed information on processes and outcomes than the baseline.

In tabulating and presenting results, estimates of indicators are presented separately for each district or state as the case may be, and in most cases, the average program-wide estimates are not emphasized. This pattern has been followed to retain the focus on individual states and districts, among which there is considerable variability.

Also, statistical significance tests are not presented for most primary results, such as when comparing estimates for indicators across baseline and endline surveys, or across rounds of RAPs. Most of the surveys were large sample surveys, designed to detect differences of 10 percentage points or more between two comparable rounds. While confidence intervals or p values could have been presented, this would have made the already large tables, each bearing results from eight states or districts, even less user-friendly. Instead, the authors have taken the view that it is safe to assume that a difference of 10 percentage points or more between rounds is likely to be statistically significant in most cases, and that showing statistical significance for differences of less than 10 percentage points may not be convincing from a program perspective. Thus, descriptions of results also generally distinguish between differences of 10 percentage points or more (as being statistically significant and programmatically relevant in most cases), and lesser differences (as being not convincing in most cases). While this approach oversimplifies the presentation of results, it should help the general reader interpret results more easily. More experienced and interested readers will look deeper, in any case.

Results and Discussion

Changes in Antenatal and Newborn Care Practices

Maternal (Antenatal) care as relevant to neonatal outcomes

Table 3.1 presents state-specific estimates and changes seen between baseline and endline surveys for various antenatal⁴ and newborn care indicators likely to affect neonatal outcomes.

Antenatal Tetanus Toxoid

Per policy, two doses of Tetanus Toxoid (TT) are administered to pregnant women to prevent maternal and neonatal tetanus. While some states are increasingly emphasizing the policy of administering one dose during pregnancy in cases where two doses had been administered in a previous pregnancy within the past three years, many still follow the simple 2-dose norm for every pregnancy, which obviates the need for reliable past records. During surveys, women were asked how many doses of TT they had received during their recent pregnancy. Coverage rates for 2-dose TT were seen to range from 69 percent in Rajasthan to 92 percent in Andhra Pradesh and West Bengal at the endline survey (Table 3.1, page 8). Increases from the baseline were in the range of 10 percentage points or more in five of the eight states. Of the remaining three, high coverage had already been achieved in Andhra Pradesh and West Bengal. In Rajasthan, however, there was no discernible change from the baseline. Not shown in the table, TT coverage with one dose is nearly universal (over 90 percent) in six of the eight states, with Uttar Pradesh and Rajasthan being a little lower at around 80 percent coverage. Assuming this to be the norm for most pregnancies, and assuming that not more than 30-40 percent of pregnancies are first pregnancies – particularly in states having lower TT coverage – protection from tetanus is likely to be even more effective than suggested by the reasonably high 2-dose coverage figures. The high coverage can be attributed in most states to health system efforts, since most women report the source of TT injections to be the ANM. The only exception is the panel district of Jharkhand (Lohardaga), where almost a third of women, including significant proportions of poorer women, report paying for TT shots from sources other than the ANM.

From RAPs in panel districts, information about *timeliness and source of the TT vaccine* is available, and certain wide-spread inadequacies become apparent. While the gap between two doses is less than two months in about 70 percent of cases in all states, the time at which the vaccine is administered varies widely. The proportion of women receiving the first dose of TT before the sixth month begins varied from 21.7 percent in the panel district of Rajasthan to 65.7 percent in the Andhra Pradesh district (data from Rounds 2 and 3 combined – Table 3.1 on pp. 8-9), while the proportion of women receiving the second dose of TT before the seventh month begins ranged from 4.5 percent in Rajasthan to 49.0 percent in Andhra Pradesh. In West Bengal, where the coverage rates are the highest, reaching 92 percent for two doses, the corresponding timeliness rates were 26.3 percent and 14.0 percent – almost all women received their second dose in the last three months of pregnancy. High but late coverage suggests that this could be a

⁴ A separate paper in this series, *Widening Coverage of Micronutrient Supplements*, deals with the data on iron supplements during pregnancy.

norm consciously practiced. Such late vaccination could leave the women (and neonates) vulnerable to tetanus, particularly in cases of premature birth and in those cases without previous exposure to TT.

Antenatal check-ups

As had become obvious early in the program from the NER and the RAPs in panel districts, “antenatal check-ups” reported by women often did not include most essential elements, and thus high rates of “3+ ANC received” were quite meaningless. Therefore, the program emphasized the need for making antenatal check-ups more meaningful. For instance, greater emphasis was laid on ensuring check-ups in the last trimester, and ensuring that each check-up included blood pressure measurement and physical abdominal examination.

Limited information on these indicators was available from the baseline survey, however, Table 3.1 presents comparisons in the proportion of women reporting that their *blood pressure had been measured at least once* during pregnancy. As shown, this proportion increased by the endline in most states, exceeding 20 percentage points in six states. Rajasthan is the only state showing no improvement. Despite large increases, a little more than half of all women reported having ever had their blood pressure measured during pregnancy at the endline. The exception is Andhra Pradesh, where virtually all women reported having had blood pressure measurement at least once.

The pattern for having received *abdominal check-up at least once*, not shown in the table, is similar, with somewhat better coverage than for blood pressure measurement across states.

The proportion of women who reported that they had *ever been weighed and given an abdominal check-up and a blood pressure measurement* (not shown in the table) also increased significantly from 20 to 41 percent at the program level, but with minimal change in Uttar Pradesh and Rajasthan. While these increases are heartening, it is important to note that these are minimalist indicators, and even so, large proportions of women are not reached even with this level of service. Large gaps still exist in almost every state between current and desirable levels of antenatal care.

Institutional and attended childbirth

The RCH program of the Government of India aims to vastly increase the *proportion of deliveries taking place in institutions*, with a target of reaching 80 percent country-wide by 2010. As can be seen from Table 3.1, there were significant reductions in the proportion of home deliveries in Andhra Pradesh, Madhya Pradesh and Uttar Pradesh from the baseline to the endline.⁵ Other than in the former two and in West Bengal, over 75 percent of births still take place at home. Of those delivered at home, only a small proportion was delivered by skilled attendants, even at the endline, and there was no appreciable change in this proportion since the baseline.⁶ At the endline,

⁵ The comparison between baseline and endline surveys in the case of Madhya Pradesh may not be valid, however, particularly for this indicator, since the baseline used for Madhya Pradesh corresponds to the area currently under Chhattisgarh, as explained in detail in the paper, *Methods Used for Assessments*. The true reduction in home deliveries in Madhya Pradesh may not be as large as presented.

⁶ While INHP did support the national goals of increasing institutional childbirth and skilled birth attendance, it was not within the scope of the project to either increase the availability of skilled attendants or to strengthen facilities for institutional childbirth. The data presented for this indicator are primarily meant to serve the purpose of providing a context in which to understand other indicators.

Table 3.1: Antenatal and neonatal care indicators, Baseline vs Endline (2001-2006)

Indicator	Andhra Pradesh			Chhattisgarh			Jharkhand			Madhya Pradesh		
	BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change
ANTENATAL AND NATAL CARE												
<i>n</i> ¹	192	670		172	703		150	590		172	614	
BP measured during pregnancy at least once	69.1	97.0	27.9	21.6	75.5	53.9	13.0	53.2	40.2	21.6	51.2	29.6
Received at least 2 doses of TT during pregnancy	86.7	92.0	5.3	53.1	81.0	27.9	64.2	85.2	21.0	53.1	78.8	25.7
Proportion delivered at home	55.2	30.6	-24.6	93.0	84.1	-8.9	76.7	84.9	8.2	93.0	67.6	-25.4
<i>n</i> ²	106	205		160	577		115	501		160	415	
Delivered by a skilled attendant	13.3	24.3	11.0	12.7	13.0	0.3	2.1	4.2	2.1	12.7	5.6	-7.1
ANM	9.8	14.6	4.8	10.2	11.1	0.9	0.7	3.2	2.5	10.2	2.7	-7.5
Govt doctor	0.1	2.4	2.3	0.6	0.0	-0.6	0.0	0.0	0.0	0.6	0.5	-0.1
Pvt doctor	3.4	7.3	3.9	1.9	1.9	0.0	1.4	1.0	-0.4	1.9	2.4	0.5
NEONATAL CARE												
<i>n</i> ²	106	205		160	577		115	501		160	415	
Warmth												
Delayed bathing for at least 3 days	0.0	38.0	38.0	0.9	34.6	33.7	0.7	56.9	56.2	0.9	35.1	34.2
Immediate drying and wrapping	na	1.9		na	5.3		na	2.2		na	7.7	
Cleanliness												
Use of "five cleans"	15.9	62.4	46.5	50.2	56.8	6.6	67.1	70.3	3.2	50.2	42.9	-7.3
New blade to cut cord	80.6	88.3	7.7	81.3	87.2	5.9	96.7	93.6	-3.1	81.3	91.6	10.3
New thread to tie cord	56.0	86.3	30.3	89.3	85.4	-3.9	97.6	91.2	-6.4	89.3	88.0	-1.3
Attendant washed hands	83.1	93.6	10.5	80.6	86.2	5.6	90.5	88.9	-1.6	80.6	87.0	6.4
Clean surface used for delivery	53.0	98.0	45.0	97.6	92.2	-5.4	97.4	96.0	-1.4	97.6	93.7	-3.9
Nothing applied to the cord	32.4	79.0	46.6	70.3	80.2	9.9	73.0	88.4	15.4	70.3	58.1	-12.2
Use of "four cleans" (cord excluded)	33.9	79.0	45.1	66.2	70.7	4.5	84.9	77.6	-7.3	66.2	72.8	6.6
Feeding												
Initiated breastfeeding within 2 hours of birth	44.4	74.1	29.7	31.9	67.1	35.2	7.2	60.1	52.9	31.9	52.6	20.7
Did not feed prelacteals to their newborn babies	64.5	85.4	20.9	23.8	83.4	59.6	11.7	83.8	72.1	23.8	71.3	47.5
Initiated breastfeeding within 2 hours and not given prelacteals	36.8	67.7	30.9	7.0	61.1	54.1	0.9	52.8	51.9	7.0	41.3	34.3
Practice of all three desirable behaviors												
(delayed bath+ breastfeeding within 2 hours + no prelacteals + applied nothing to cord)	16.4	54.8	38.4	3.7	50.4	46.7	0.9	48.3	47.4	3.7	25.1	21.4

*n*¹ = Mothers of children 0-5 months old
na = not applicable

*n*² = Children 0-5 months old born at home

BL = Baseline survey, EL = Endline survey

Change = Change from BL to EL

	Orissa			Rajasthan			Uttar Pradesh			West Bengal			All India		
	BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change
	185	690		221	623		253	614		197	634		1542	5138	
	25.0	65.6	40.6	29.7	28.6	-1.1	15.4	25.3	9.9	48.4	69.6	21.2	32.4	55.6	23.2
	68.6	82.5	13.9	66.8	68.9	2.1	64.4	74.1	9.7	87.0	91.8	4.8	70.7	82.3	11.6
	88.1	81.9	-6.2	77.8	76.1	-1.7	81.0	76.1	-5.0	61.4	62.5	1.0	75.5	71.9	-3.6
	163	565		172	474		205	467		121	396		1202	3600	
	8.5	17.0	8.5	18.8	19.8	1.0	7.4	5.7	-1.7	0.5	4.1	3.6	8.2	11.2	3.0
	5.7	5.5	-0.2	8.9	17.1	8.2	3.6	3.6	0.0	0.0	0.8	0.8	5.2	7.0	1.8
	0.8	3.5	2.7	6.4	0.8	-5.6	2.5	0.0	-2.5	0.0	1.0	1.0	1.1	1.0	-0.1
	2.0	8.0	6.0	3.5	1.9	-1.6	1.3	2.1	0.8	0.5	2.3	1.8	1.9	3.2	1.3
	163	565		172	474		205	467		121	396		1202	3600	
	2.2	40.5	38.3	3.5	25.9	22.4	0.4	47.1	46.7	5.1	60.0	54.9	1.9	42.5	40.6
	na	4.8		na	12.0		na	9.4		na	12.3		na	7.1	
	17.9	61.4	43.5	42.6	49.4	6.8	26.7	56.3	29.6	41.0	67.7	26.7	39.2	58.3	19.1
	85.4	92.4	7.0	90.7	92.8	2.1	96.3	99.1	2.8	94.0	94.4	0.4	89.3	92.6	3.3
	86.2	92.2	6.0	93.1	91.6	-1.5	98.1	97.6	-0.5	94.2	96.0	1.8	87.7	91.2	3.5
	55.8	80.4	24.6	71.3	81.0	9.7	65.0	85.6	20.6	76.0	85.2	9.2	76.1	85.4	9.3
	54.2	92.2	38.0	95.2	97.5	2.3	96.1	96.4	0.3	97.4	98.2	0.8	84.0	95.1	11.1
	42.3	79.6	37.3	55.2	66.0	10.8	41.5	69.0	27.5	58.5	81.8	23.3	55.1	75.5	20.4
	29.9	73.8	43.9	68.6	74.5	5.9	61.2	80.9	19.7	69.7	80.6	10.9	60.5	75.8	15.3
	33.5	55.4	21.9	22.4	28.5	6.1	6.5	56.3	49.8	42.5	56.3	13.8	26.2	54.9	28.7
	55.9	73.6	17.7	27.0	29.1	2.1	8.1	57.8	49.7	46.4	60.9	14.5	30.6	66.9	36.3
	28.3	47.1	18.8	12.7	16.5	3.8	1.9	45.3	43.4	16.9	41.9	25.0	14.9	46.1	31.2
	10.1	40.1	30.0	10.5	10.7	0.2	1.0	36.0	35.0	10.5	37.3	26.8	6.6	35.3	28.7

the highest use of private doctors for home deliveries was in Orissa (8 percent) and Andhra Pradesh (7.3 percent), while the highest use of the ANM was in Rajasthan (17.1 percent), but much smaller in the remaining states. Overall, almost a quarter of all home deliveries were conducted by skilled attendants in Andhra Pradesh, followed by Rajasthan (19.8 percent) and Orissa (17 percent). Not shown in the table, Madhya Pradesh was the state with the highest proportion reported delivered by trained *dais* (over 40 percent of home deliveries) while the proportion of home deliveries conducted by relatives was the highest in Orissa (47.6 percent), followed by Uttar Pradesh (41.1 percent), although much smaller in other states. All these factors hold considerable significance for immediate newborn care and for neonatal outcomes in home deliveries.

Newborn care

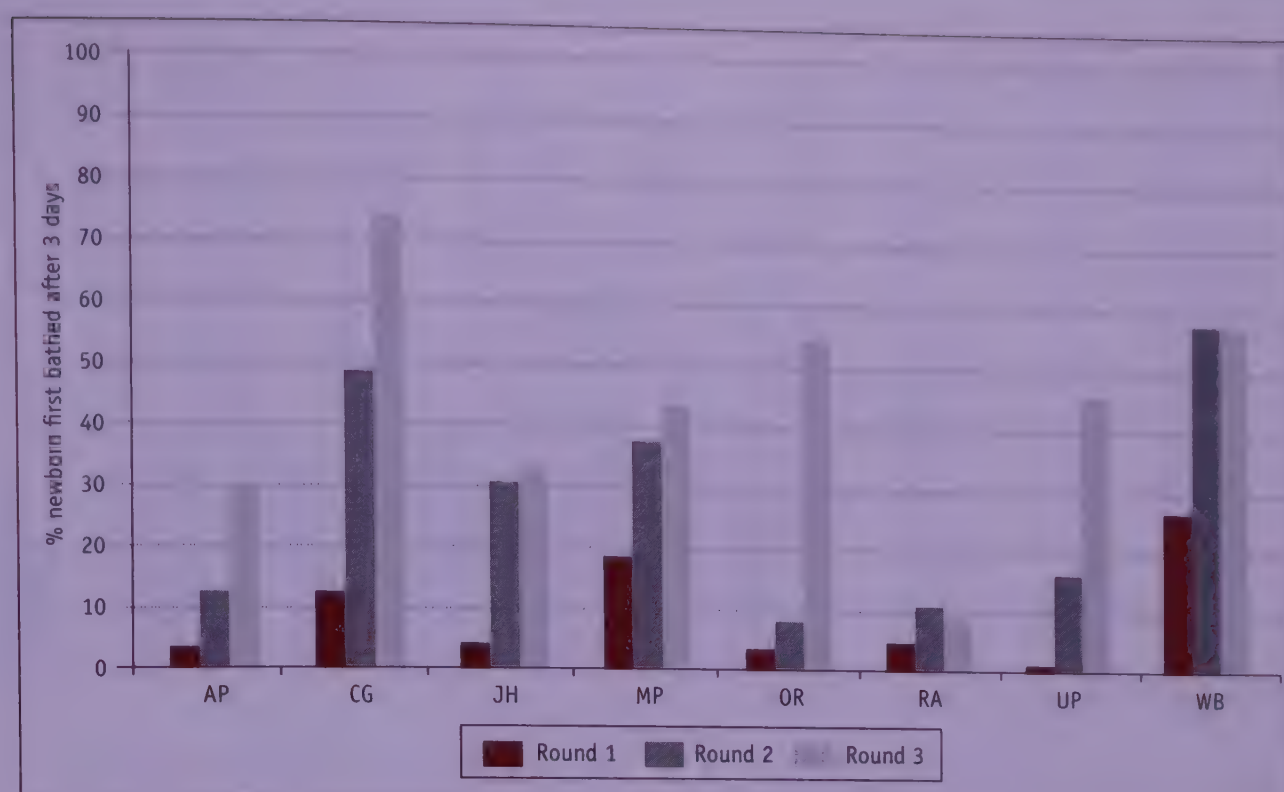
Since a large proportion of neonatal mortality occurs in the first few days after birth, the prevalence of desirable practices during this period is of direct relevance to neonatal outcomes. Presumably, such practices would vary by whether the baby was delivered at home or in an institution. In this section, results are presented for babies delivered at home. The influence of institutional delivery on newborn care provided at home is dealt with in a later section.

Thermal care

Drying and wrapping immediately after birth is a sensitive indicator of the provision of adequate warmth to the newborn, particularly the manner in which it is defined in the program. A newborn baby was considered to have been dried and wrapped immediately if the baby had been wiped dry before the placenta was delivered, and wrapped up immediately after drying. This was thought to be a useful definition since this directly assesses any change in the widely prevalent custom related to childbirth, of leaving the newborn alone until the placenta has delivered, and thus is a useful indicator of the sensitivity of the birth attendant and the family to the question of hypothermia at birth. The reported practice of this indicator is very low (< 15 percent) across all states even at the endline (Table 3.1). Change over time cannot be assessed here since information for this indicator is not available for the baseline, but given the low prevalence of the desirable practice at the endline, the picture cannot be very different at the baseline. In the RAPs, similarly low levels of practice were observed, with small but significant increases seen over the last two rounds in two districts.

Another indicator of the efforts made at home to keep the baby warm is the extent to which the family *delayed the first bath* for the baby after birth. The promotion of the practice of delaying the first bath for up to a week was a major priority of the program until the mid-term, by when it became clear that there was no specific evidence linking this to better neonatal survival. Nevertheless, this practice had become a rallying point for the special care needed for the newborn baby, and rapid change was seen in the reported practices in the program area. The reported practice of *delaying bath beyond three days*, increased in large proportion in every state from almost zero levels at the baseline, to 25-60 percent at the endline (Table 3.1). From evidence from the RAPs (Figure 3.1), it is also clear that, even as late as end-2003, not more than 10 percent were practicing this in five of the eight states, and in all eight districts, the practice increased several fold over the next two years. Even if some of this

Figure 3.1: Rate of change in the practice of delaying the first bath to three days or more over three rounds of RAPs (2003, 2004, 2005), in panel districts. Home-delivered infants, 0-5 months old.



improvement in reported practice was simply attributable to better “knowledge” of what was expected rather than a true report of actual practice, it is still a remarkable example of how rapidly an apparently well-entrenched practice can change over a short time – even at huge scale, given adequate program emphasis.

The “cleans”, including cord care

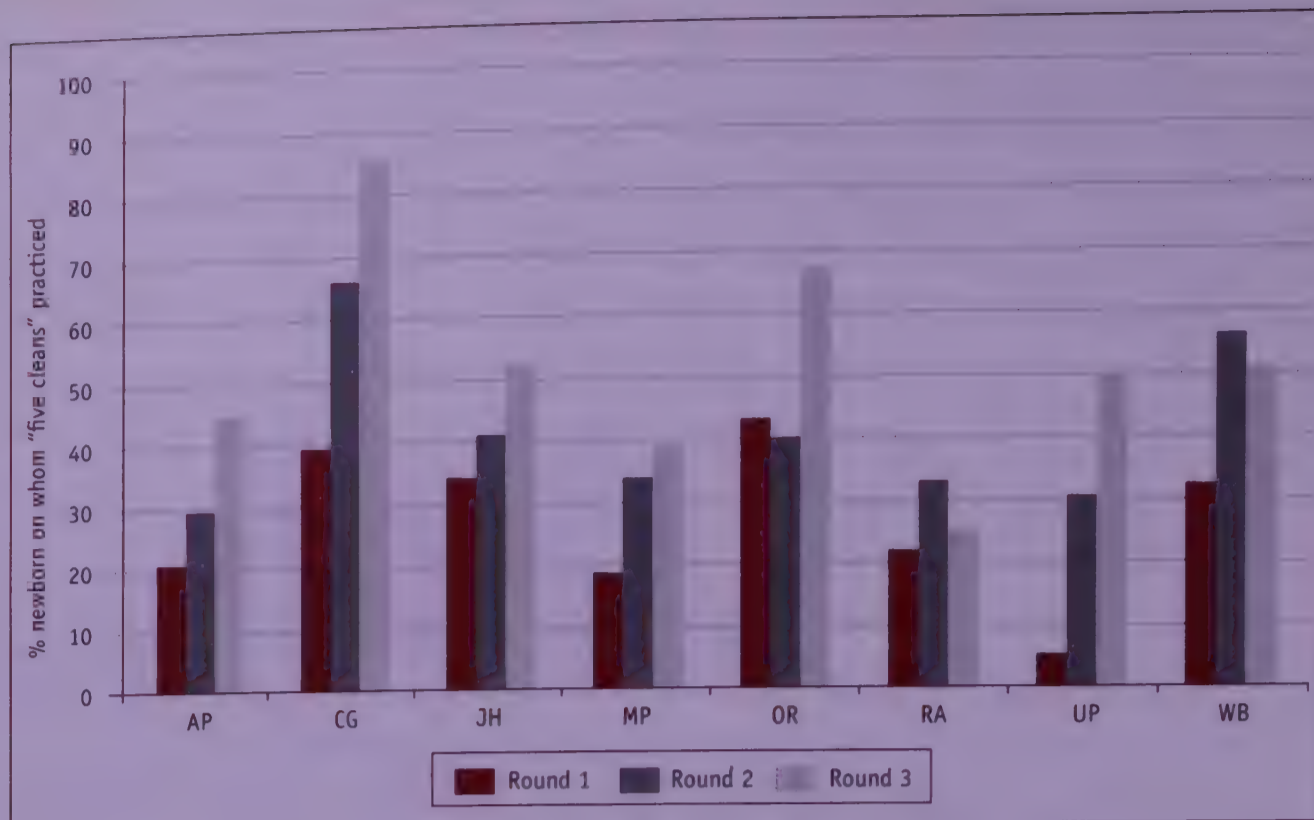
The reported *use of all “five cleans” at birth* (defined here as use of soap for washing hands, new blade⁷, clean thread, clean cloth and applying nothing to the cord stump, for women delivering at home) has shown a substantial increase in four out of eight states in the endline – Andhra Pradesh, Orissa, Uttar Pradesh and West Bengal (Table 3.1). When seen in terms of individual cleans, it is clear that the reported practice of the use of a new blade and new or clean thread was nearly universal even at the baseline in 2001.⁷ Similarly, except for two states (Andhra Pradesh and Orissa), the reported practice of delivering on a clean surface was also very high at the baseline. High levels of these three “clean” practices were maintained at the endline.

The reported practice of the attendant washing hands with soap before attending to the childbirth was lower than 80 percent in four states (Orissa, Rajasthan, Uttar Pradesh and West Bengal) at the baseline, while the practice of not applying anything to the cord stump at birth was lower than 70 percent in all states at the baseline. Apart from a 12 percent reduction in the practice of applying nothing to the cord stump at birth in Madhya Pradesh (which could be due to an inappropriate baseline, as mentioned earlier), both practices have clearly improved by the endline. In the states where the practice of all five “cleans” has increased, the increase can be attributed mainly to the improvement in the practices of washing hands and applying nothing to the cord stump.

Relative to the high levels of reported practice of the individual “cleans” at the endline, the practice of all of them together is lower at about 58 percent at the

⁷ One possible reason for very high rates of reporting use of a new blade and clean thread is the use of leading questions in both, the baseline and (consequently) the endline surveys. However, field observations indicate that the rates of these practices are indeed very high across all areas.

Figure 3.2: Rate of change in the practice of “five cleans” over three rounds of RAPs (2003, 2004, 2005), in panel districts. Home-delivered infants, 0-5 months old.



program level at the endline. The component least practiced was the avoidance of applying anything to the cord stump at birth, and thus it becomes relevant to know what materials were applied to the cord stump. Such information is not available from the baseline and endline surveys. From other surveys, it appears that at least some of the materials applied to the cord stump may not in themselves be harmful.ⁱⁱ

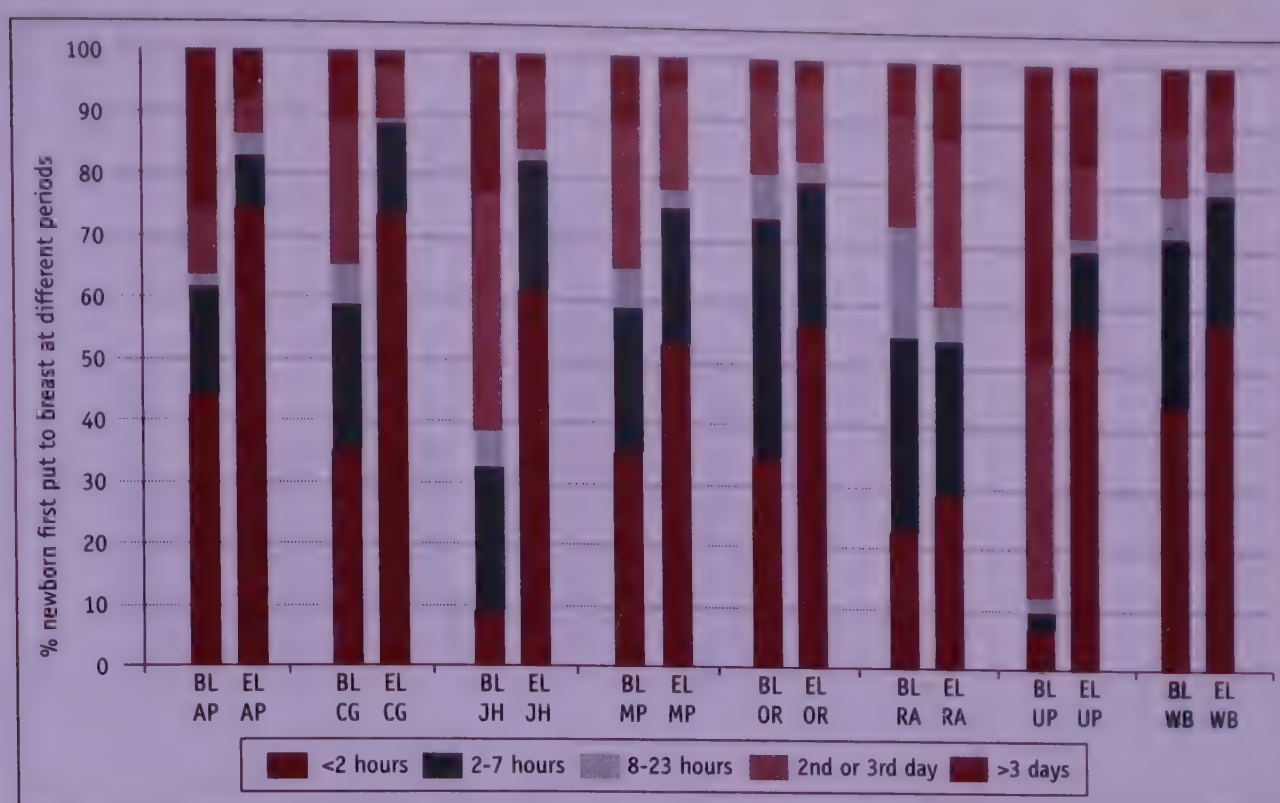
As in the case of delayed bathing, evidence from the panel districts also indicates that the rate of change in the practice of “five cleans” has been rapid since 2003, showing large increases between 2003 and 2005 in all panel districts other than the one in Rajasthan (Figure 3.2).

Breastfeeding and the feeding of other liquids

The program promoted *immediate breastfeeding at birth*, which was most commonly conveyed as “breastfeed within one hour of birth” in practice. This practice is not easy to measure in large surveys.ⁱⁱⁱ It was possible, however, to generate robust estimates for “breastfeeding initiated within two hours” across surveys, and thus this indicator has been used as a proxy for immediate breastfeeding at birth. As seen in Table 3.1, the proportion of women who *initiated breastfeeding within two hours* improved substantially across all states by the endline, with Rajasthan being the sole exception, where there was apparently little change. The largest increments were seen in Jharkhand and Uttar Pradesh (about 50 percentage points each). Despite large improvements, over 40 percent were still being put to breast after two hours in most states at the endline.

Figure 3.3 shows the shift that has occurred between the baseline and the endline in the proportion of babies first put to breast at different points in time after birth. Except in the case of Rajasthan, the shift to earlier initiation of breastfeeding is apparent. From this, it also seems that the distribution of the time of initiation of breastfeeding is biphasic, with large proportions concentrated in the first few hours and again beyond the first day. This could mean that the response to programmatic interventions is to change directly from very late feeding to very early feeding, with very few mothers reporting starting after the first few hours but before the next day at the endline (Figure 3.3). Early in the program, the emphasis on feeding

Figure 3.3: Proportion of children put to breast during successive time periods after birth, RACHNA Baseline-Endline (2001-2006). Home-delivered infants, 0-5 months old.



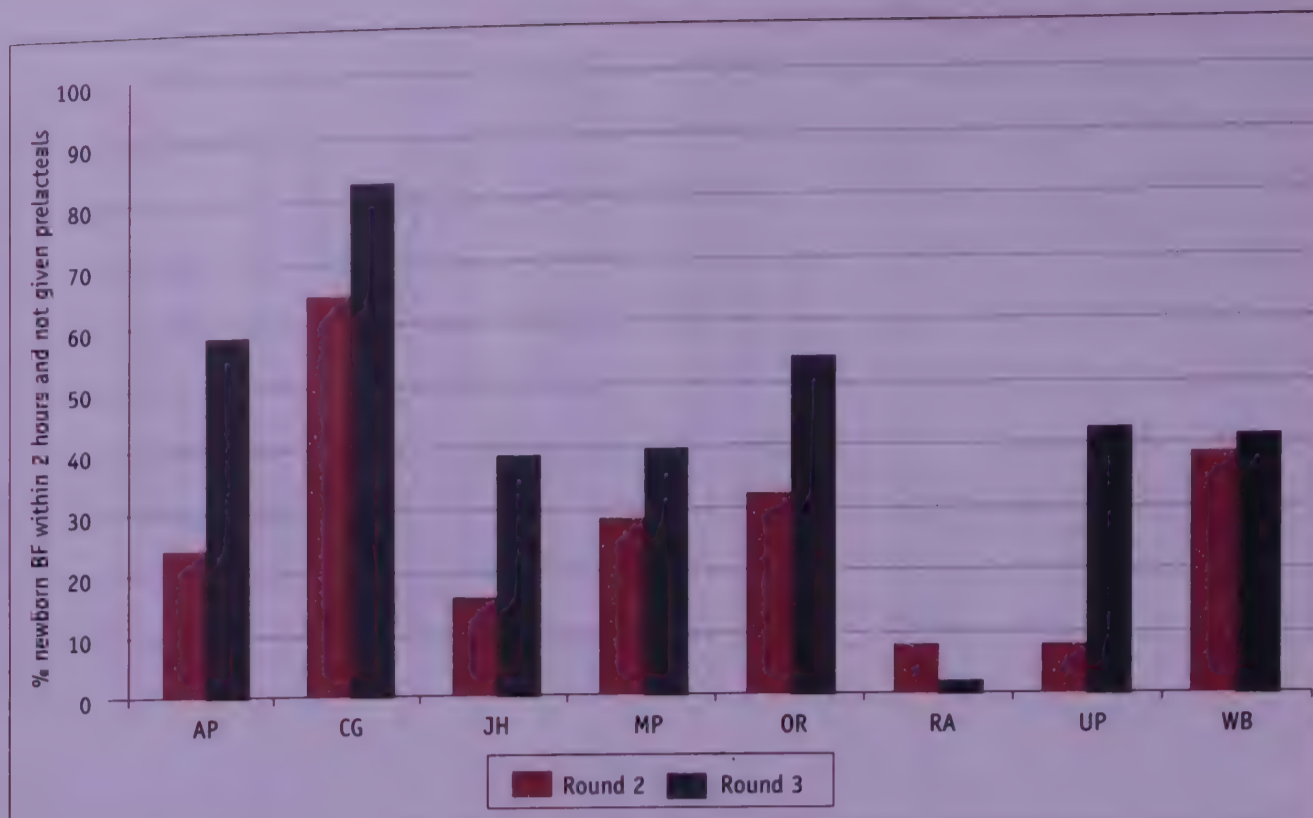
colostrums was re-articulated as early breastfeeding, and thus no data was collected regarding feeding colostrums in any survey.^{iv}

The practice of feeding the neonate sweetened liquids, usually in small amounts, in the first few days after birth, is a time-honored ritual across most communities, justified on the basis of several beliefs related to the child's digestion and health, and the undesirability of "first milk". However, it appears to be practiced largely to keep the child quiet before lactation begins, and lactation is widely perceived to begin on the third day after birth. Such liquids may be fed before the child is first put to the breast ("prelacteals"), or may be given even after breastfeeding has been started (what may be called "extra-lacteals"). Table 3.1 presents state-specific estimates of women who reported breastfeeding their child but *not giving prelacteals* for the baseline and endline. It is seen that in all states but one, the practice of giving prelacteals has come down considerably, with a program level change of about 36 percentage points. The largest change is seen in Chhattisgarh, Jharkhand, Madhya Pradesh and Uttar Pradesh, and in seven of eight states at the endline, about 60 percent or more mothers reported not giving prelacteals. The exception is Rajasthan, showing no change over five years, possibly because the practice there is rooted in strong tradition. Similar trends were observed between round 2 and 3 of the RAPs (Figure 3.4).

Baseline data is not available for the practice of giving *extra-lacteals* in the first few days of life. At the endline, about 14 percent of interviewed mothers reported feeding extra-lacteals (not shown in table). The highest proportions reporting giving extra-lacteals were in Madhya Pradesh, Rajasthan and Uttar Pradesh, at around 20 percent. In those cases where the child is not fed prelacteals, but is fed extra-lacteals, there is presumably a perception that breast milk is not adequate (or there are other problems with breastfeeding). About a quarter of those who reported giving extra-lacteals also reported *not* giving prelacteals - that is, they started feeding some liquids to the newborn *after* initiating breastfeeding.

Another useful question is the extent of influence of the practice of feeding such liquids in the first few days of life on continued exclusive breastfeeding. Overall,

Figure 3.4: Rate of change in the practice of breastfeeding within 2 hours and not giving prelacteals, RAPs Rounds 2 and 3 (2004 – 2005). Home-delivered infants, 0-5 months old.



those who reported that they gave either pre-lacteal or extra-lacteal feeds in the first few days after birth were about 2.5 times more likely than the rest to report that they did not exclusively breastfeed their child in the 24 hours preceding the interview in the age group 0-6 months (data not shown). Thus, pre-lacteal and extra-lacteal feeding may be an important marker that predicts later exclusive breastfeeding.

The correct practice of warmth, breastfeeding and cleanliness, all together

The greatest impact on neonatal outcomes may logically be expected among those who practice all aspects of care correctly. While the indicators assessed in these surveys are only indicative, composite indicators, combining several of individual indicators, would arguably identify with greater confidence the proportion of neonates at lowest risk of adverse outcomes. The estimates for the proportion of women who reported practicing all three newborn care behaviors described above (delaying the first bath *and* breastfeeding within two hours *and* not given prelacteals *and* applying nothing to the cord at birth) at the baseline and endline are presented in Table 3.1. Large increments are seen in the proportion of women reporting that they practiced all three behaviors in states other than Rajasthan, from very low levels at the baseline to up to around 50 percent at the endline.⁸

Variation Across Areas

For each of the indicators discussed above, there is wide variation across program areas, both in terms of the absolute levels of achievement by the end of the program and in terms of change over time. This is well illustrated when one compares state-level estimates (program baseline, endline) and district-level estimates for districts of the same states (RAPs in the panel districts), and the changes in these estimates over time. Figure 3.5 compares absolute levels of one illustrative example of newborn care practiced in late 2005 in the panel district and the levels in the corresponding state as seen in the endline survey in early 2006, estimated by similar methods. While the district and state figures are close to each other in Uttar Pradesh and West Bengal, the differences in other cases

⁸ The very low baseline levels in this composite indicator can be attributed to the very low levels of the practice of delayed bathing.

Figure 3.5: Delayed bath for at least 3 days: Comparison of coverage in RAPs Round 3 (2005) vs State Endline (2006). Home-delivered infants, 0-5 months old.

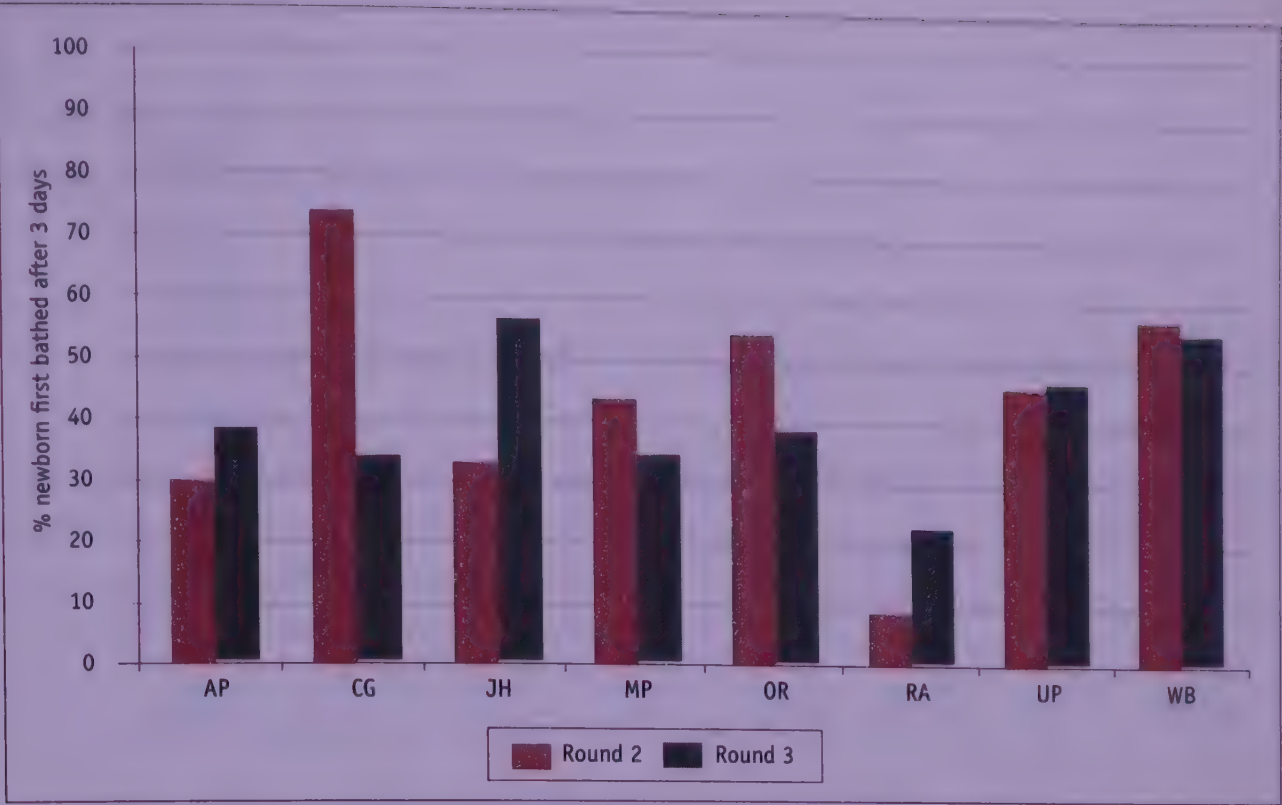
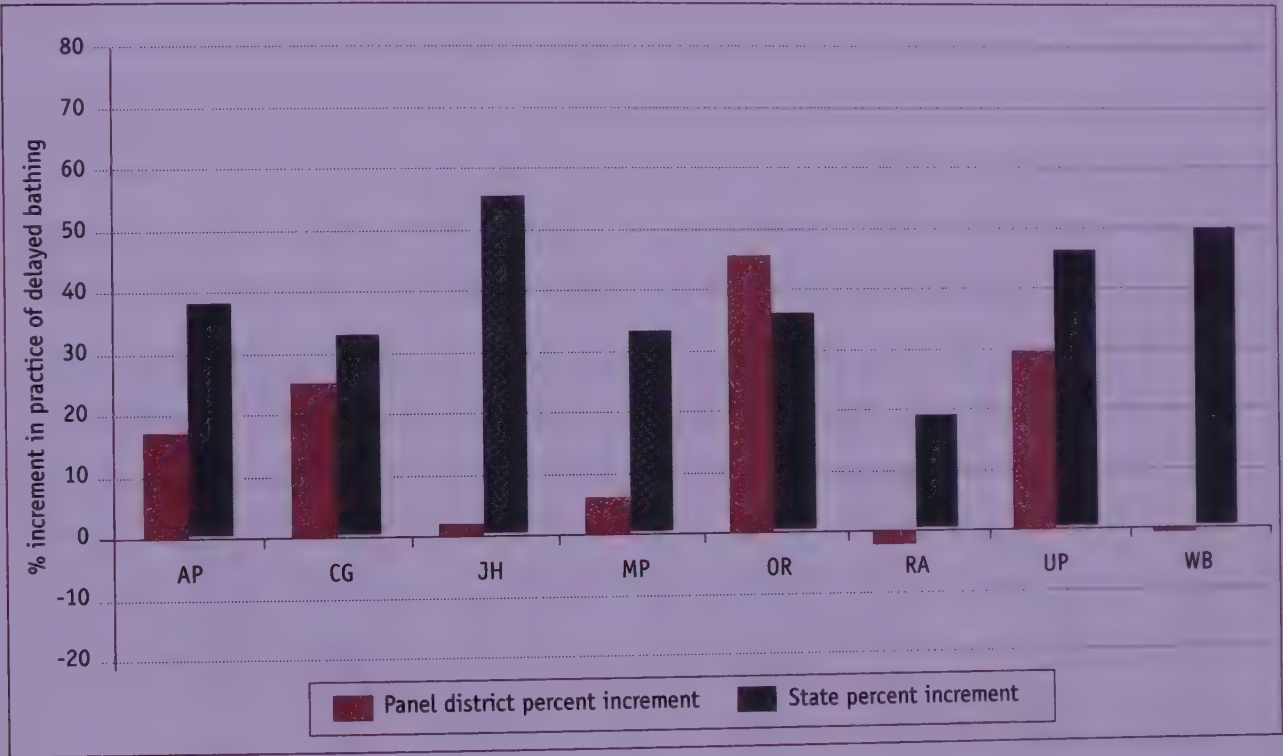


Figure 3.6: Delayed bath for at least 3 days: Annual percent increment between surveys - RACHNA Baseline-Endline (2001-2006) vs RAPs Rounds 2-3 (2004-2005). Home-delivered infants, 0-5 months old.



are around 10 percentage points or more. In three of the cases, the coverage in the district is more than that in the state, while the reverse holds true in the remaining two cases. Figure 3.6 compares average annual increments seen in the panel district and the respective state. The differences between the panel district and the state are even more stark on this indicator, and illustrate how a state like Rajasthan recording an increment of about 20 percentage points from baseline to endline (2001-2006), includes a district exhibiting a reduction over 2004-2005. Similar patterns are seen in the case of other indicators.

This variation across districts (and possibly across sub-district regions, although not measured in the program) represents the complex influence of variation in factors such as socio-demographics, geographical access, and program intensity – the last particularly prone to changes over time. It also is illustrative of the extent of variation that is hidden by aggregates and averages, and should remind us that except at very low or very high average coverage levels, averages alone are insufficient to assess progress.

In sum, there have been significant increases in almost all important newborn care behaviors from the baseline to the endline over the life of INHP-II, in all states other than Rajasthan, and evidence suggests that these changes have occurred mainly since 2003, as the interventions began reaching larger portions of the program universe.

Differences between RACHNA-served and Other Areas

RACHNA Endline vs CES 2005 and NFHS-3

The recently concluded NFHS-3 survey was conducted approximately at the same time as the RACHNA endline, and should be comparable for questions that were similarly asked in both surveys. Separate estimates are available for rural, urban and “all” areas for NFHS, of which rural estimates are used in this paper for comparison with RACHNA, which is largely a rural program. Since NFHS-3 represents state-wide estimates, these may be interpreted as the weighted average of estimates for RACHNA-served areas (represented by RACHNA endline) and estimates for non-RACHNA-served areas (which are not available from any source). A similar interpretation is possible using estimates from UNICEF CES, the last round of which was conducted in late 2005, again using rural estimates. Unfortunately, there are not many indicators that are directly comparable between these different surveys, particularly from what is available from NFHS-3 and CES reports. RACHNA endline data has been analyzed to derive indicators defined as similarly as possible to those available from these reports.

Figure 3.7 compares proportions of births which took place in institutions as found in CES 2005, NFHS-3 and RACHNA endline surveys. CES and NFHS estimates are expectedly close to each other in most states, while RACHNA endline estimates are either similar to or lower than the other two. This is particularly marked in Orissa. This difference could reflect the somewhat lesser access to maternity institutions in RACHNA-served areas. Strengthening institutions was not a mandate of RACHNA, but this comparison provides a perspective of the context of RACHNA-served areas.

Figure 3.7: Institutional births: Comparison of coverage in CES (2005), NFHS-3 (2006) and RACHNA Endline (2006).

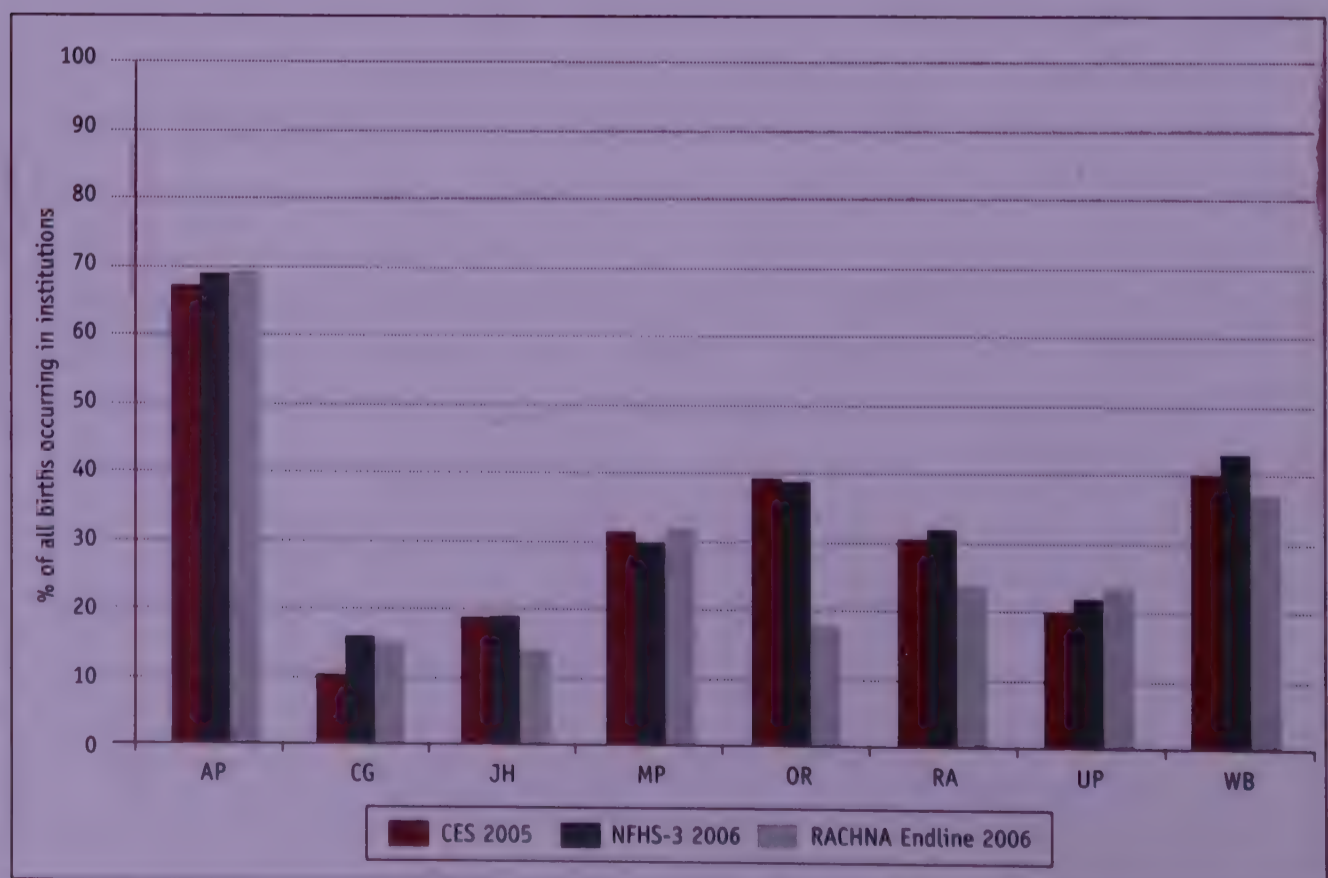
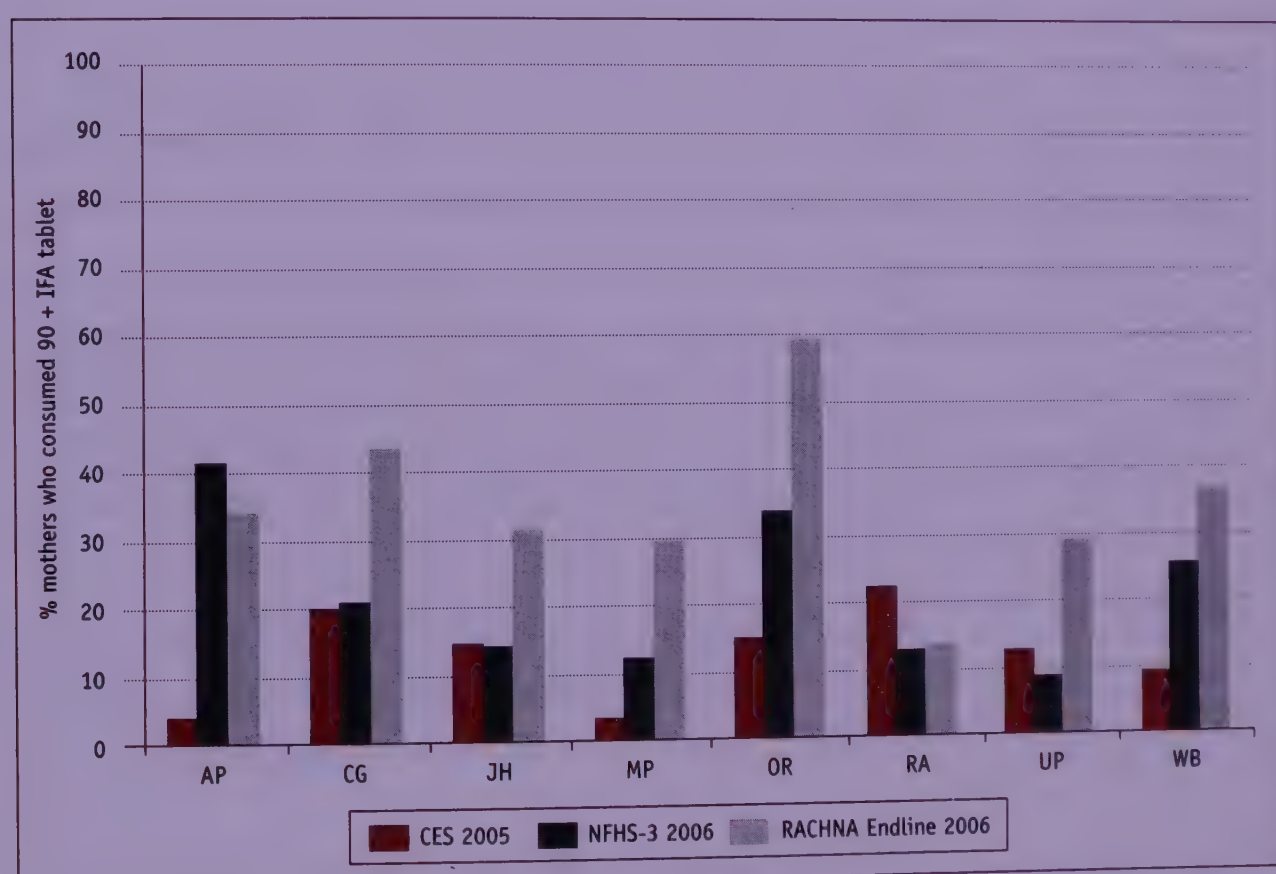


Figure 3.8: At least 3 antenatal check-ups: Comparison of coverage in RACHNA Endline (2006), NFHS-3 (2006) and CES (2005).



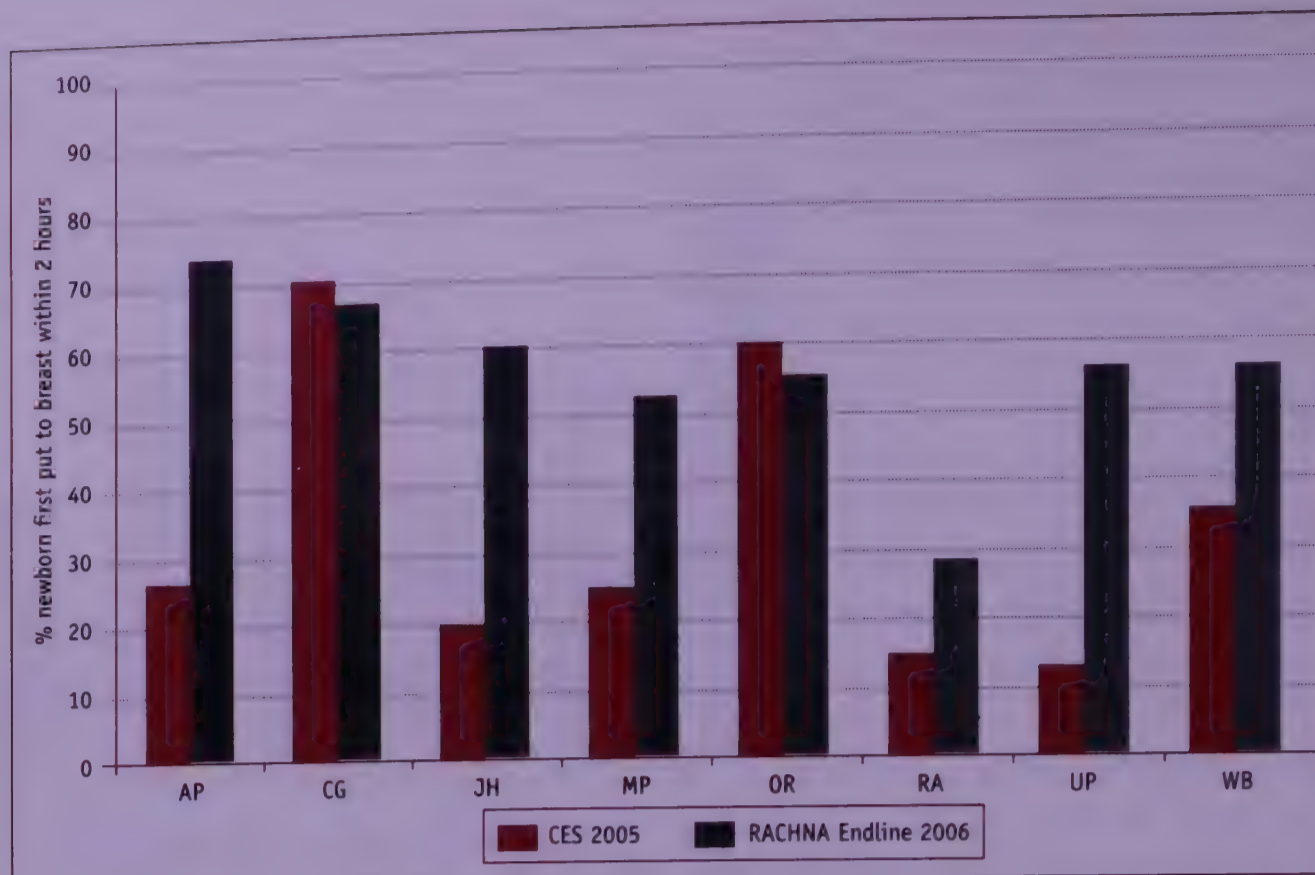
Figure 3.9: Consumed 90 or more IFA during pregnancy: Comparison of coverage in CES (2005), NFHS-3 (2006) and RACHNA Endline (2006).



Figures 3.8 and 3.9 compare estimates of CES 2005, NFHS-3 and the RACHNA endline for two antenatal care indicators – the proportion of mothers who reported being checked at least three times during pregnancy and the proportion of those who reported consuming at least 90 iron folate tablets, respectively.

With the exception of Orissa and Rajasthan, the RACHNA endline estimates for *at least three check-ups* are consistently higher than CES estimates (Figure 3.8). Estimates from NFHS-3, however, are much higher than the RACHNA endline estimates in four of the eight states (Chhattisgarh, Orissa, Rajasthan and Uttar Pradesh). This would seem to indicate that antenatal check-ups reached a much larger proportion of women in non-RACHNA-served areas – a finding difficult to explain of itself and is likely to be related to the differences in the way the questions were framed in the two surveys.^v

Figure 3.10: First breastfed within 2 hours of birth: Comparison of coverage in CES (2005) and RACHNA Endline (2006).



The proportion of women reporting that they consumed at least 90 IFA tablets is much higher in the RACHNA endline than in either of the other two surveys in virtually all states (Figure 3.9), but here, the very low estimates from CES in some of the states are difficult to explain.

Figure 3.10 presents comparison between CES and RACHNA endline surveys for those children breastfed within two hours of birth. Except in Chhattisgarh and Orissa, the RACHNA endline estimates are consistently much higher than CES estimates. Currently, the only estimates available for NFHS-3 are for the “breastfed within an hour” indicator, and hence are not being considered for comparison.

NFHS-3 did cover a number of other variables, including critical process variables such as home visits, which should be comparable with RACHNA endline once detailed reports and raw data sets become available.

Comparison with non-RACHNA area in the Newborn Care Evaluation Research study

The other source of evidence for making comparisons between RACHNA-served and non-served areas is the Newborn Care Evaluation Research study that was designed for such comparison between one program and one non-program district in Uttar Pradesh (Barabanki and Unnao districts, respectively). Estimates for the main newborn care indicators are available for the baseline (2003), the endline (2006) and three 9-monthly adequacy surveys in between. Figures 3.11 a-d compare the progress on four newborn care practices between the intervention and control districts over time. While a clear difference between the districts is seen in the case of thermal protection indicators (delayed bathing and immediate drying and wrapping) only by the endline, the feeding indicators (early initiation of breastfeeding and avoidance of prelacteals) have increased progressively over time in the intervention districts, while remaining virtually unchanged in the control districts. In the case of cord care (Figure 3.11e), there was slow change in both districts over time. The results of NER are discussed further.

Change across surveys in Intervention (Barabanki) and Control (Unnao) districts in newborn ER study

Figure 3.11a: Delayed bath for 3 or more days

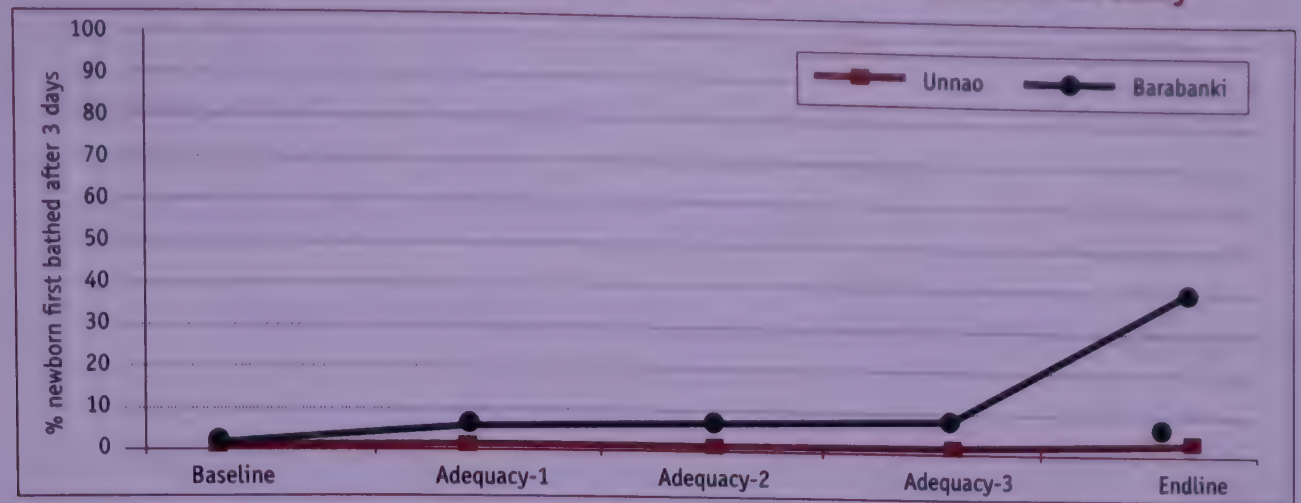


Figure 3.11b: Immediate drying and wrapping

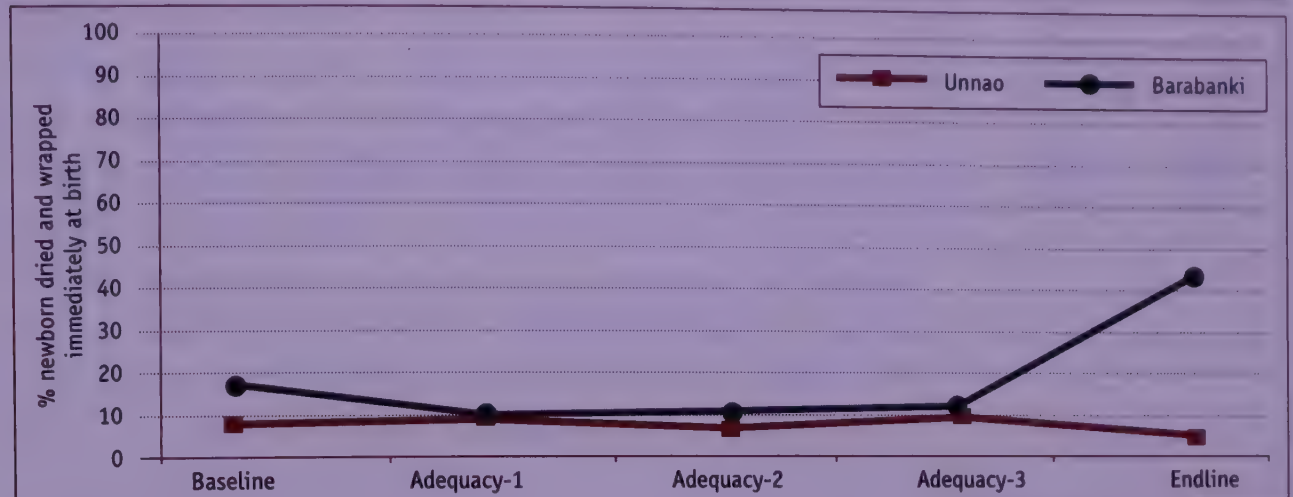


Figure 3.11c: Breastfed within 1 hour

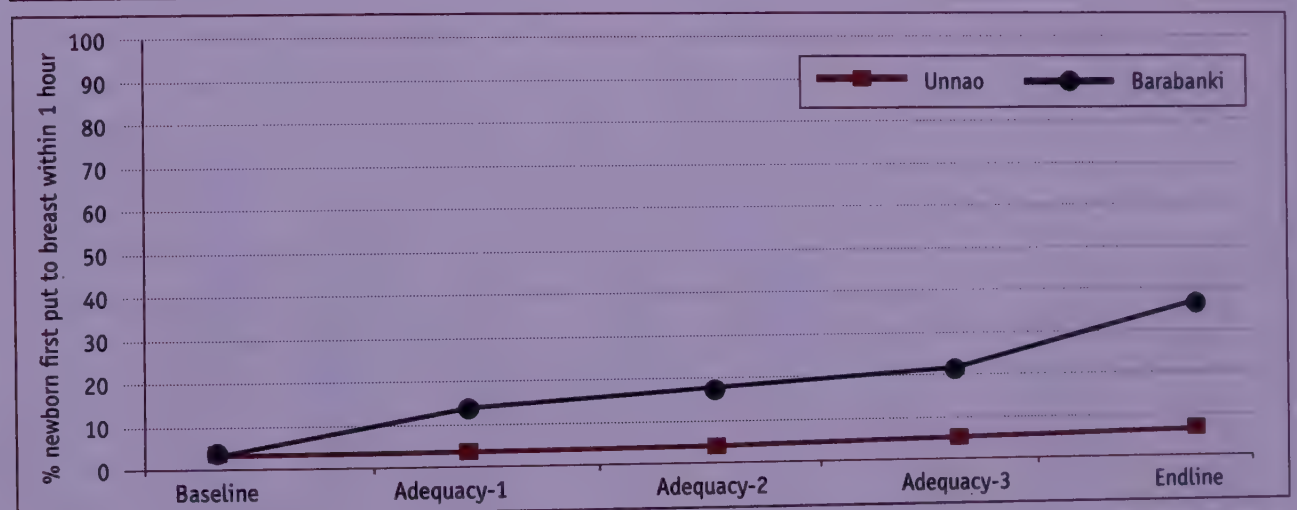


Figure 3.11d: Prelacteals not given

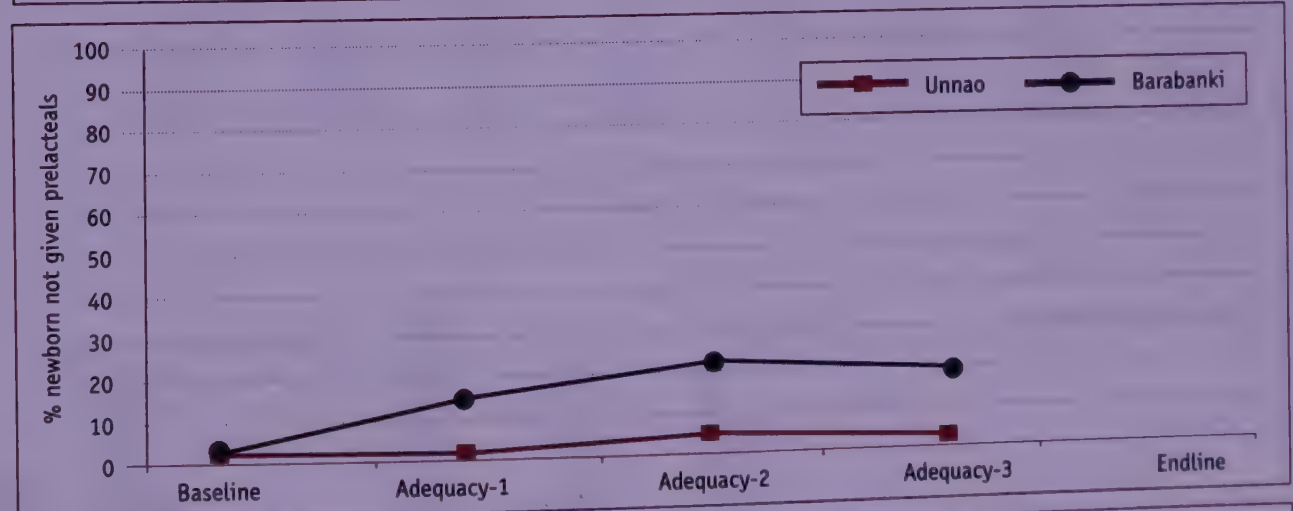
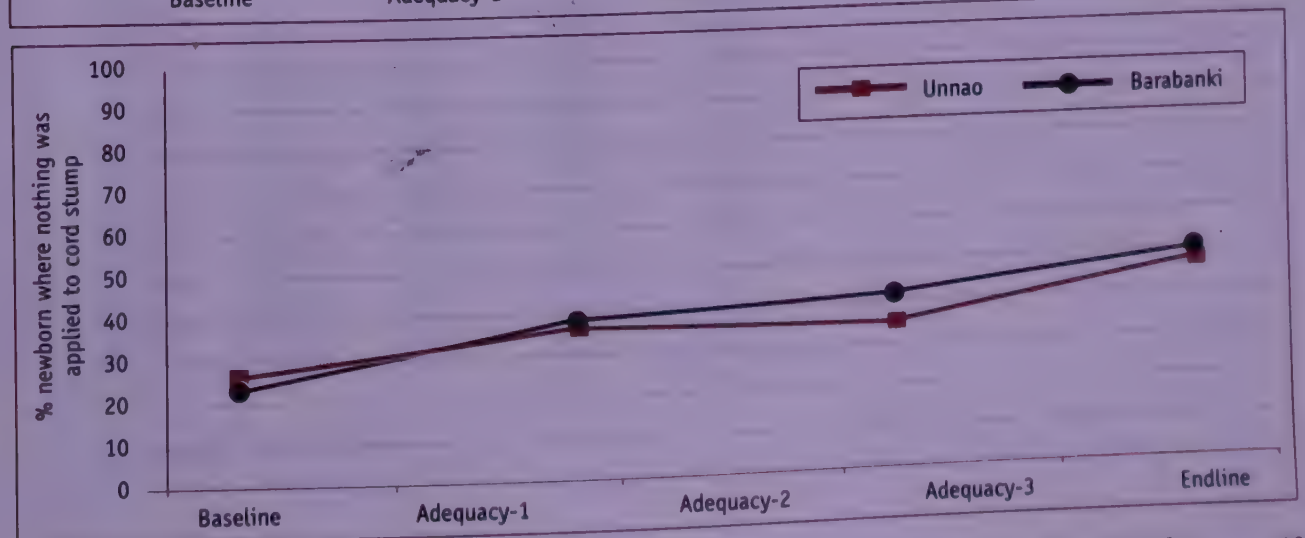


Figure 3.11e: Nothing applied to cord after birth



In sum, RACHNA-served areas appear to have shown faster improvements and achieved higher coverage for most indicators, than non-RACHNA-served areas in most contexts. The magnitude of difference and pace of change appear to be different for different indicators in different contexts. Once NFHS-3 raw datasets are available, a comparison with many more RACHNA indicators will be possible.

Factors Influencing Changes in Newborn Care Outcomes

A number of program and non-program factors are known to affect practices at the household level. Inputs from the RACHNA program that were expected to positively influence coverage were briefly mentioned at the beginning of this paper. Evidence is available from a number of sources, including the program baseline and endline surveys, the RAPs conducted in one district in each state, and the internal health management information systems of the program, about several program processes and other background variables potentially influencing coverage. This section presents evidence of the influence of various factors, especially program-related factors affecting household level practices. The influence of background characteristics such as educational background, caste, gender are discussed briefly at the end.

Institutional deliveries vs Home deliveries

The proportion of deliveries taking place in institutions has increased with time, more rapidly in some states than in others. The assumption in promoting institutional deliveries is that those exposed to professional health providers at institutions would benefit, not just from the immediate professional care at birth, but also with respect to the more authentic and authoritative information and counseling that they receive from these institutions for child care, and thus one would expect to find a larger proportion of those who delivered in institutions to be practicing desirable behaviors. Figures 3.12, 3.13 and 3.14 present data from the RACHNA endline, comparing selected newborn care indicators among those who delivered at home and those who delivered at institutions. As can be seen, in most states, the differences between the two groups are small, and in many cases,

Figure 3.12: Applied nothing to cord: Home Vs Institutional deliveries, RACHNA Endline (2006). Infants 0-5 months old.

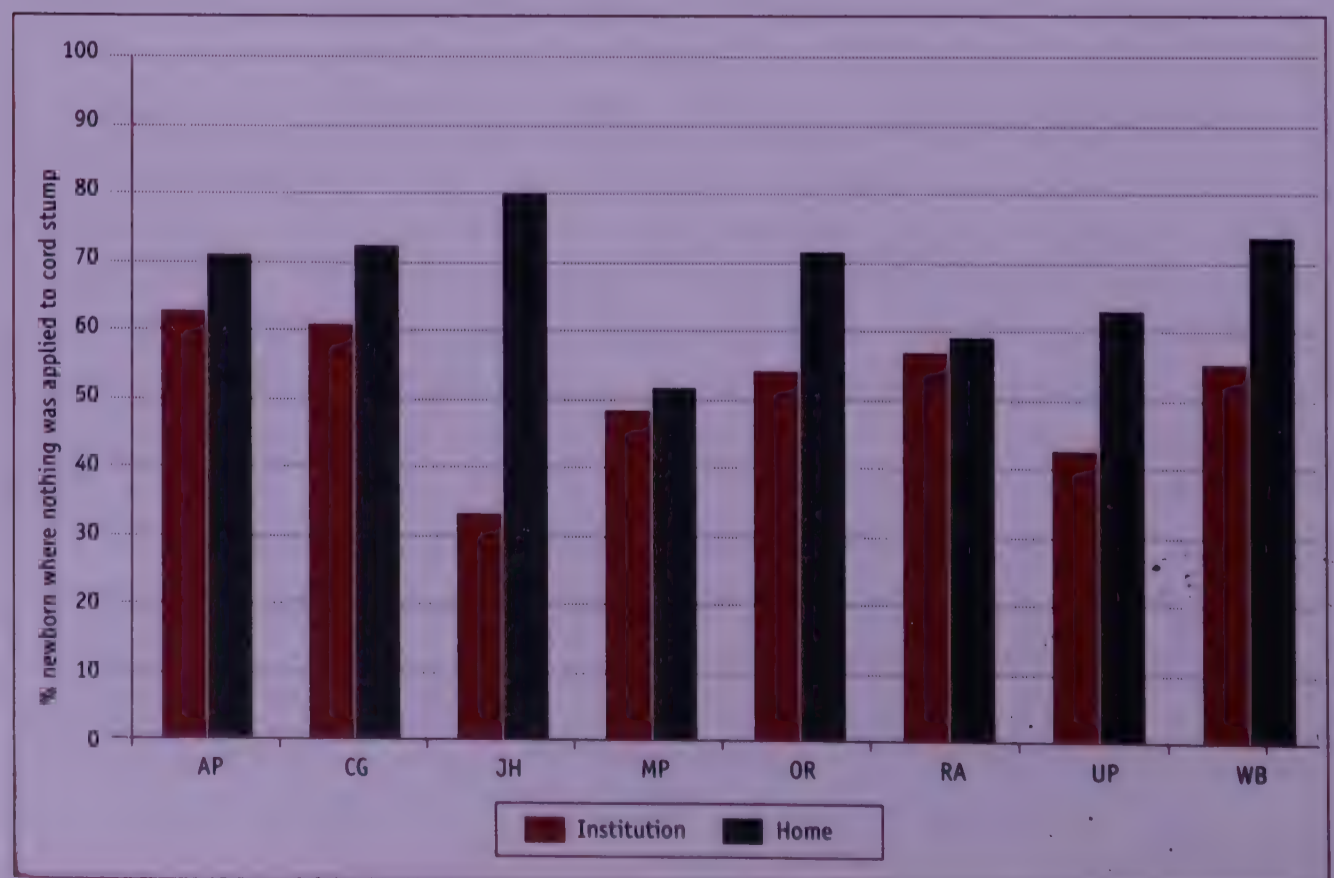


Figure 3.13: Not given prelacteals: Home Vs Institutional deliveries, RACHNA Endline (2006). Infants 0-5 months old.

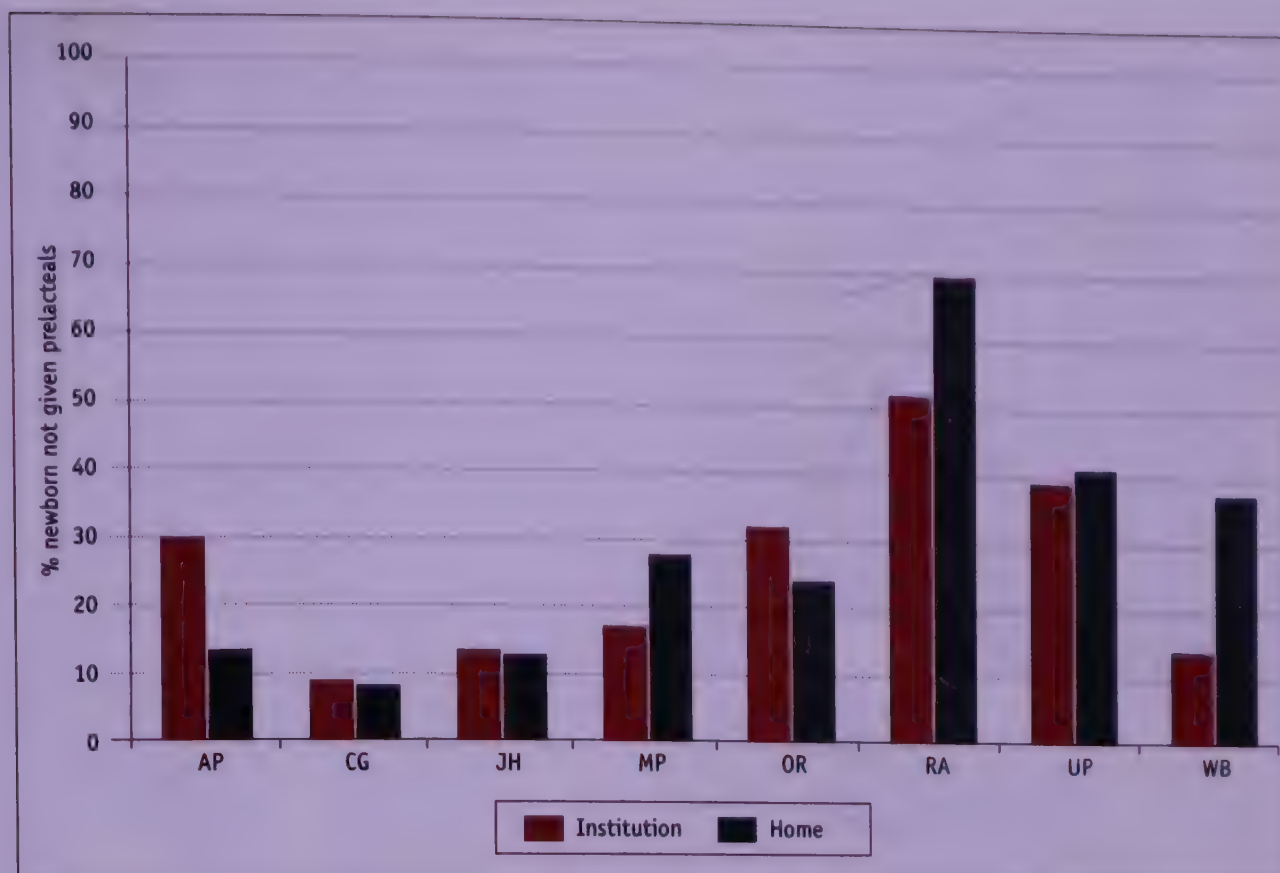
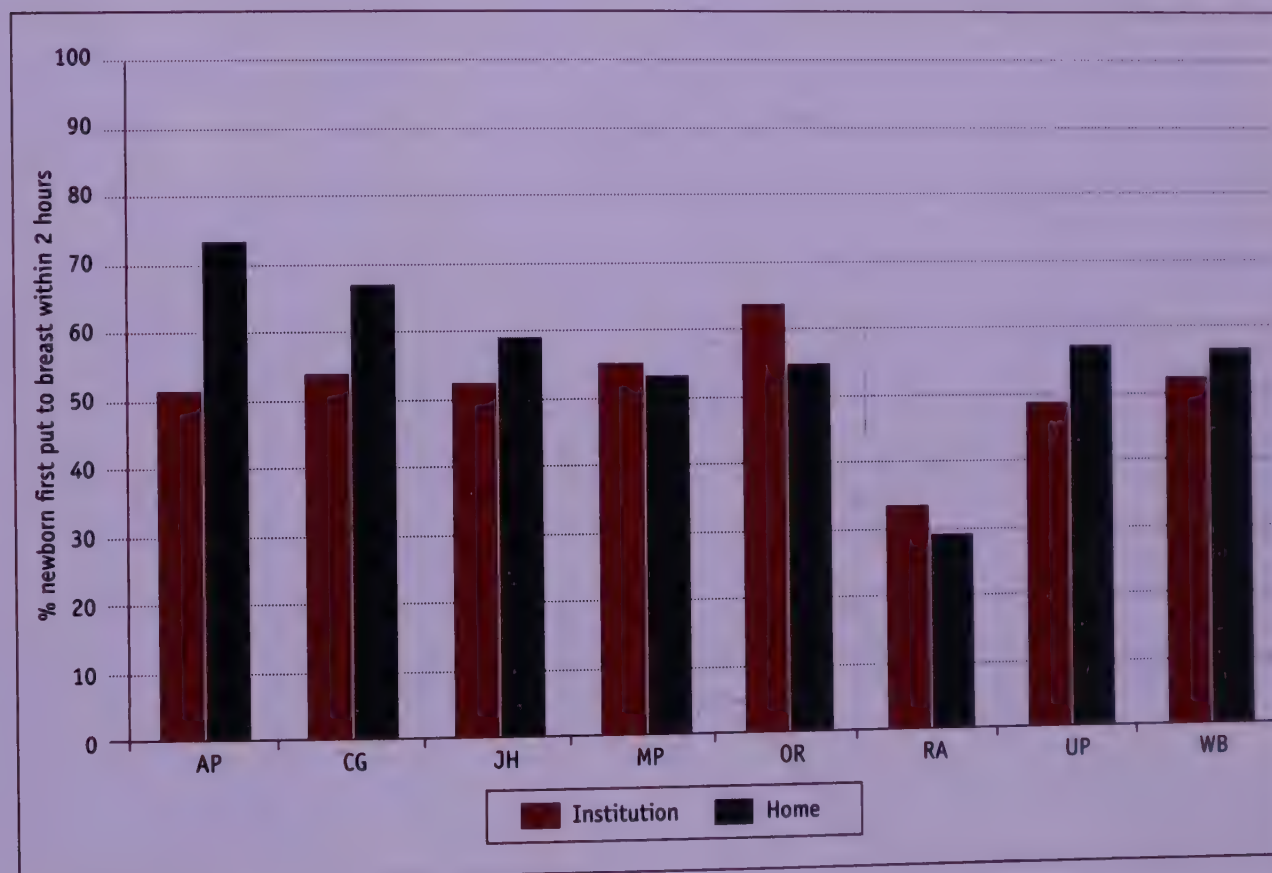
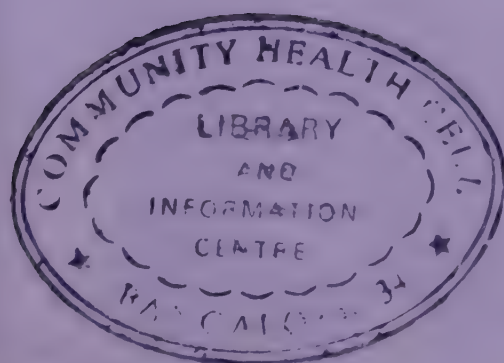


Figure 3.14: Initiated breastfeeding within 2 hours: Home Vs Institutional deliveries, RACHNA Endline (2006). Infants 0-5 months old.



women delivering at home report similar or higher levels of correct newborn care practices as those delivering in institutions.

One must of course be careful while interpreting estimates for these indicators among a small number of institutional deliveries in six of the eight states, but the consistent patterns are unmistakable. While it is less likely that anything harmful is being applied to the cord stump in institutions, it is hardly possible to explain practices such as the delays in initiating breastfeeding at birth among institutional births. In the Andhra Pradesh and West Bengal, as discussed later, newborn care practices among home-delivered babies were found less amenable to program interventions than in other states, presumably reflecting the strong influence of doctors' prescriptions among those returning home from institutional births in these two states with relatively high rates of institutional births.



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Home visits and advice

The program impact hypothesis considers meaningful contacts between mothers and service providers or volunteers (Change Agents) as critical to behavior change at the family level. In the RACHNA household surveys, respondents (mothers of children 0-5 months old) were asked about any contacts with service providers or volunteers at specified points during pregnancy and the neonatal period, including home visits, where health or nutrition related matters had been discussed. Where any contacts had taken place during these specific periods, respondents were also asked about any advice having been given about specific aspects of care during pregnancy or for the newborn child. Because the neonatal care component was added only during INHP-II, the baseline for these indicators (which is the endline of INHP-I) are not available. Therefore, endline data, supplemented by RAPs data where appropriate, is used for the purpose of this analysis. The endline data provides information about home visits, although not about contacts elsewhere, such as at the AWC or sub-center. For studying the relationship between newborn care behaviors and the interventions by service providers or volunteers, last trimester contacts at home or home visits in the first week contacts post delivery are considered, since the program promoted the use of these contacts for counseling families on newborn care. Any preventive interventions before or after this period of life would presumably have far lesser effect on neonatal outcomes.

Table 3.2 presents the illustrative associations between contacts or advice received and behaviors practiced, from the endline data. In summary:

- A combined indicator of three key newborn care practices (early and exclusive breastfeeding as an indicator of adequate feeding, whether anything was applied to the cord or not, as an indicator of cleanliness, and delayed bath as an indicator of the focus on warmth) is strongly associated with reported home visits during the third trimester or on the first day (day of birth) in six of the eight states (Odd Ratio 2.78 (1.23-11.42 across different states)).
- The practice of initiating breastfeeding within two hours of birth is strongly associated with the reported receipt of breastfeeding advice either during the last trimester of pregnancy or on the day of birth (Odd Ratio 2.95 (1.65 – 5.08)).

Figure 3.15 presents comparisons between the prevalence of reported home contacts and early breastfeeding, as an example of how close these associations can be.

Considering that such home contacts were the most important program interventions promoted in RACHNA, it is important to examine whether the proportion of women visited at home in fact changed over program life. Although, home visits in late pregnancy and early neonatal periods were not recorded at the baseline, and thus it is not possible to say whether the endline estimates for proportion of homes visited represent an improvement over the baseline for the entire project, evidence is available from the eight panel districts. Figure 3.16 and 3.17 present the trends in the proportion of women being visited at home during late pregnancy and on the day of delivery, respectively, in these districts, from 2003 to 2005. Substantial improvements were seen in at least four out of the eight districts in both indicators.

Table 3.2: Influence of selected program indicators on women who reported following selected newborn care practices, among 0-5 month olds born at home, Endline Survey (2006)

Indicator	Andhra Pradesh		Chhattisgarh		Jharkhand		Madhya Pradesh		Orissa		Rajasthan		Uttar Pradesh		West Bengal		All		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Proportion of neonates to whom all basic care was provided ^a																			
Home contacts in last trimester of pregnancy or on the day of delivery by AWW/ANM	No	29	3.4	174	9.2	208	20.7	185	8.1	225	10.2	298	2.3	184	8.2	211	23.7	1514	11.2
	Yes	176	29.0	403	22.8	293	38.2	230	13.0	340	29.7	176	8.0	283	32.5	185	27.6	2086	26.0
	Diff		-25.6		-13.6		-17.5		-4.9		-19.5		-5.7		-24.3		-3.9		-14.8
	OR		11.42**		2.92***		2.37***		1.70		3.71***		3.59**		5.43***		1.23		2.78***
Proportion of neonates who were breastfed within 2 hours of birth																			
Received advice about immediate breastfeeding during pregnancy or in the first week of delivery	No	72	65.3	238	60.9	269	50.6	265	46.0	417	48.7	381	23.4	248	38.7	321	53.0	2211	45.6
	Yes	133	77.4	339	72.0	232	71.1	150	64.0	148	74.3	93	50.5	219	76.3	75	70.7	1389	70.9
	Diff		-12.1		-11.1		-20.5		-18.0		-25.6		-27.1		-37.6		-17.7		-25.3
	OR		1.83		1.65**		2.41***		2.08***		3.05***		3.35***		5.08***		2.14**		2.91***

^aDelayed bath by 3 days or more and breastfeeding within 2 hours and not given prelacteals and applied nothing to cord stump at birth

*, **, *** represent increasing levels of statistical significance, corresponding to $p < 0.05$, 0.01 and 0.001 respectively

Figure 3.15: Comparison of proportions of mothers reporting last trimester home visits and initiation of breastfeeding within two hours, Endline (2006). Home-delivered Infants 0-5 months old.

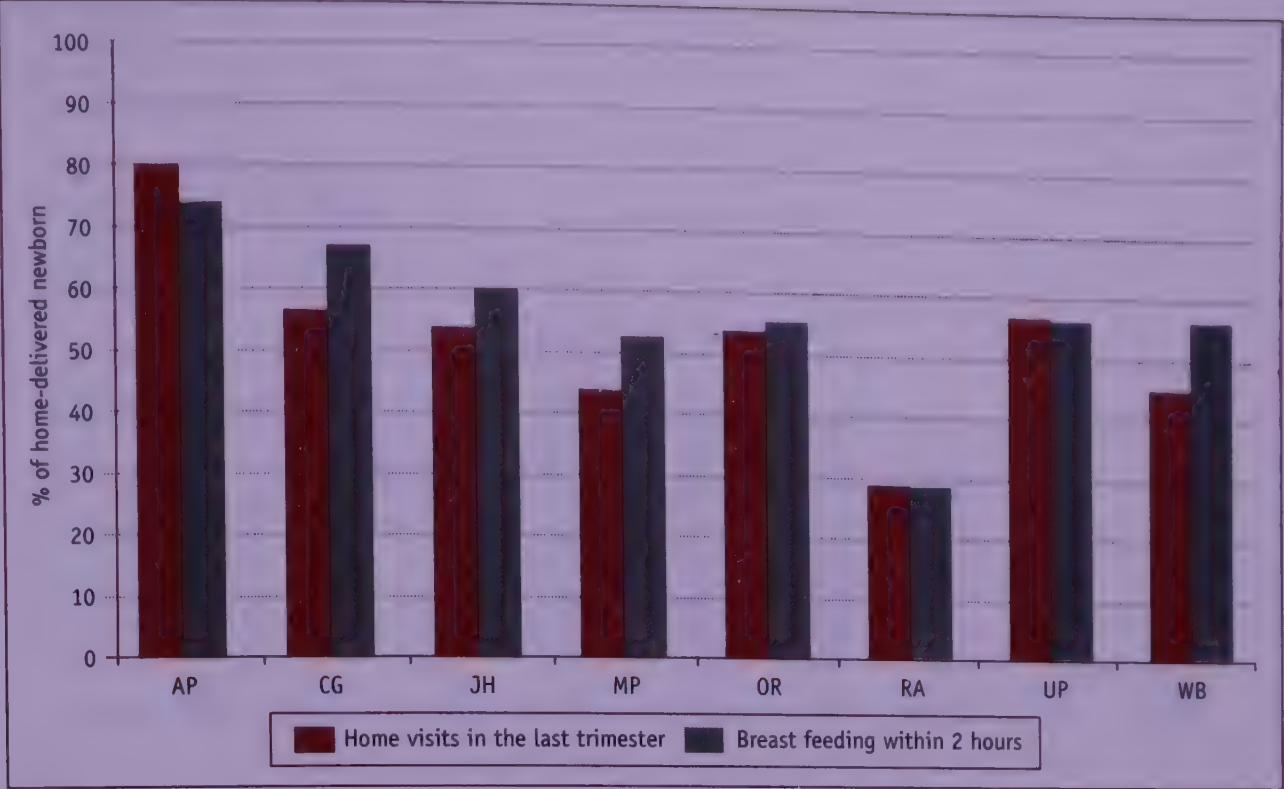


Figure 3.16: Proportion of mothers reporting home visits by AWW or ANM during the last trimester, RAPs (2003, 2004, 2005). Home delivered infants, 0-5 months old.

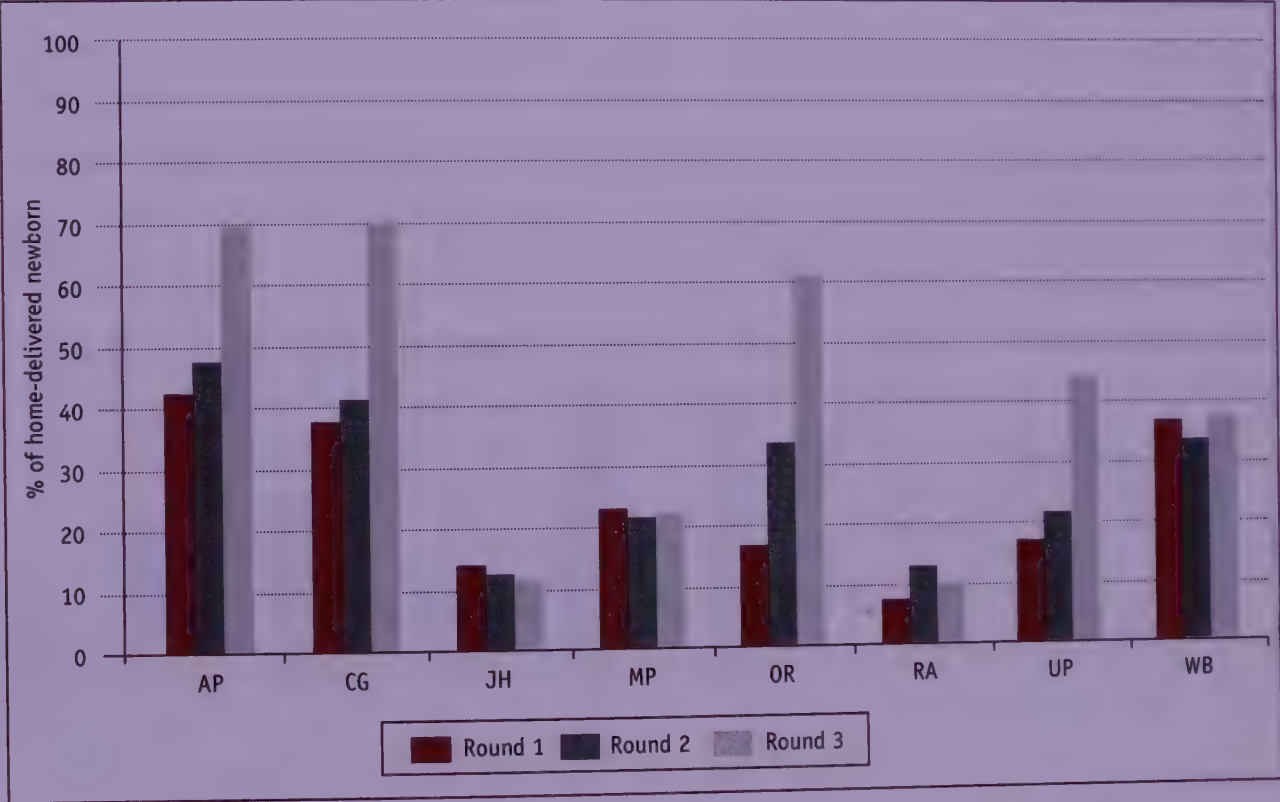
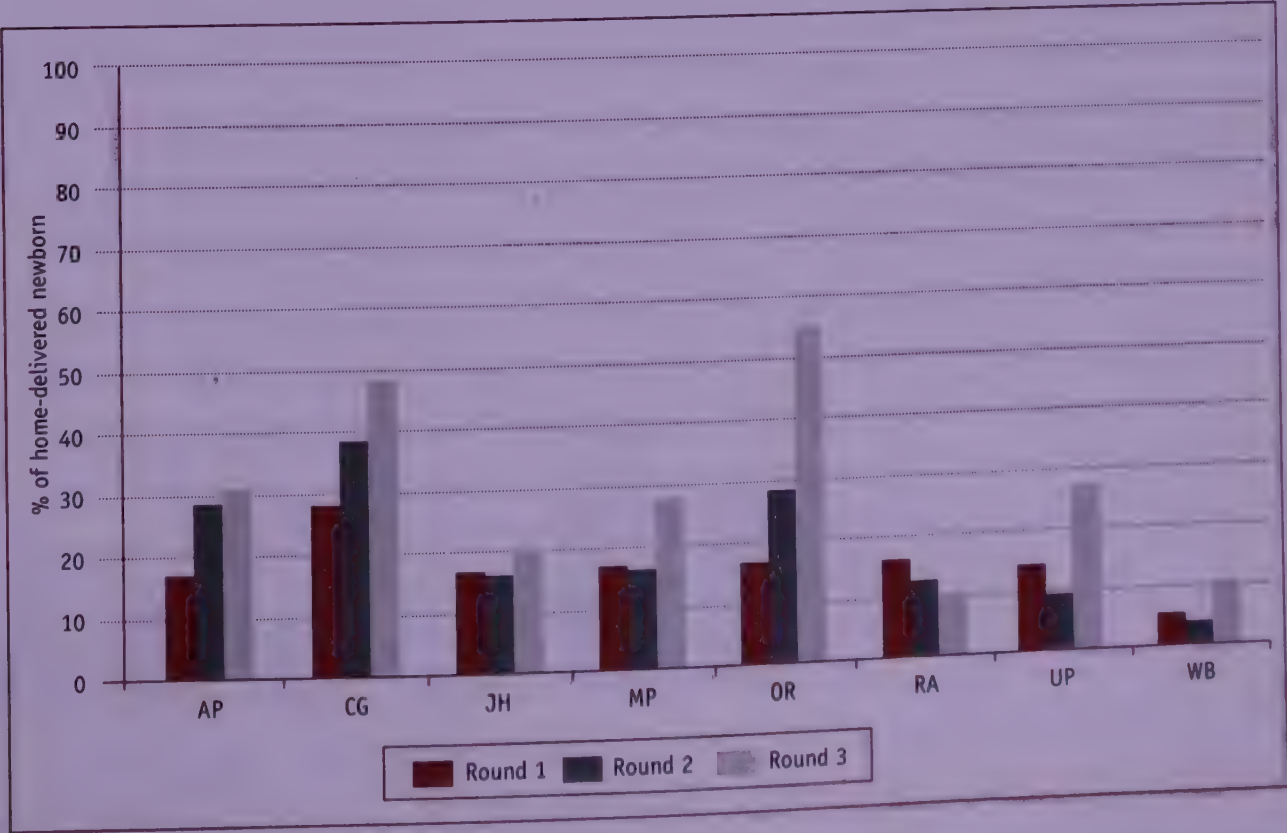


Figure 3.17: Proportion of mothers reporting home visits by AWW or ANM on the day of birth, RAPs (2003, 2004, 2005). Home delivered infants, 0-5 months old.



It is also worth examining the absolute levels of reported home contacts and advice received at critical periods at the endline for each state. In summary (not all data are presented):

- Half the women who had a home delivery reported being visited at home at least once by either AWW or ANM in the last trimester of pregnancy across the program at the endline.
- Compared to reported estimates from Round 1 of RAPs in the panel districts, estimates for home visits on the day of birth by either ANM or AWW at the endline for the corresponding states were higher by 10 percentage points or more in five of eight states. In two states (Andhra Pradesh and Chhattisgarh) close to 50 percent of the homes were visited on the day of birth, (Figure 3.18).
- Except in Rajasthan, home visits by AWW were clearly more frequent than those by ANMs (Figure 3.19). When visits were made on the day of delivery, it was almost exclusively by the AWW in five of eight states (Figure 3.20).

Figure 3.18: **Proportion of mothers reporting home visit on the day of birth by either AWW or ANM, RAP Round 1 (2003) and Endline (2006). Home delivered infants, 0-5 months old.**

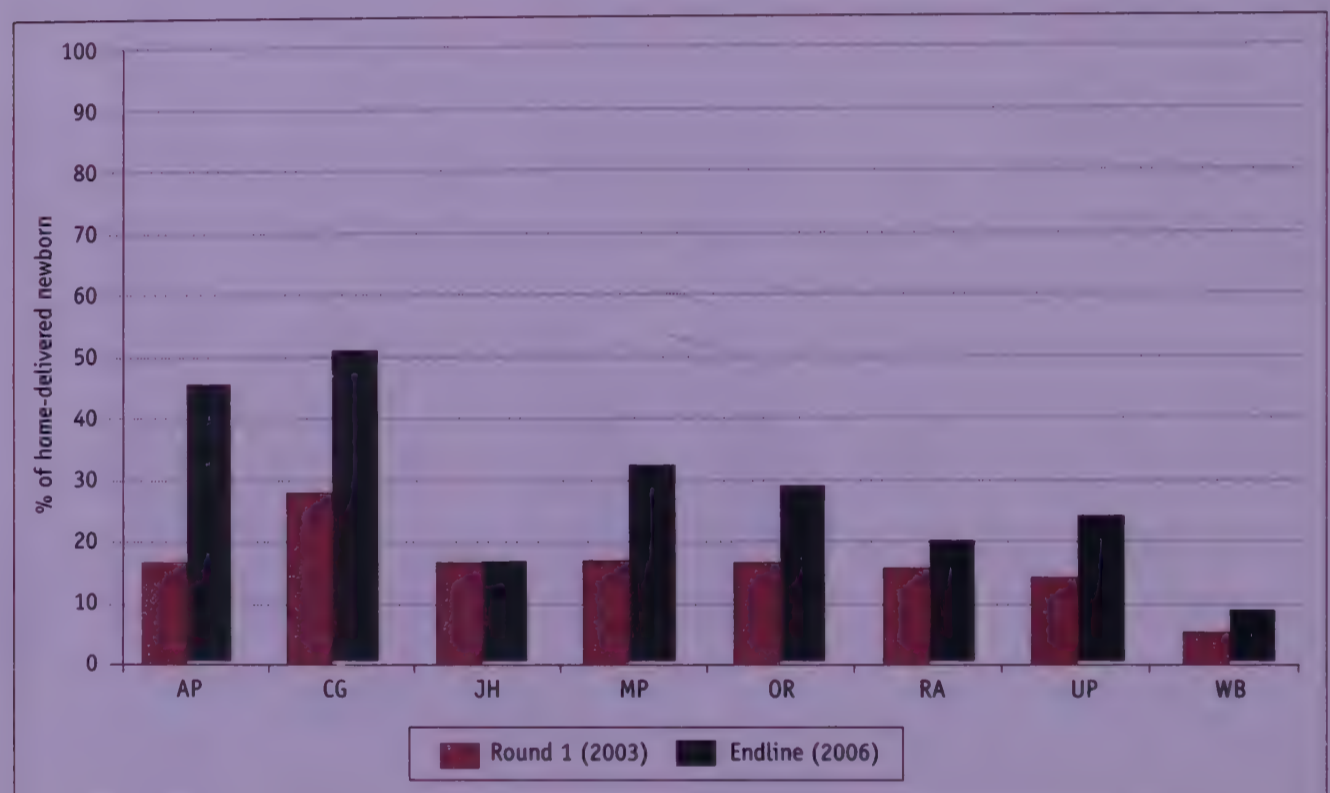


Figure 3.19: **Proportion of mothers reporting home visit on the day of birth by AWW and ANM, RACHNA Endline, 2006. Home delivered infants, 0-5 months old.**

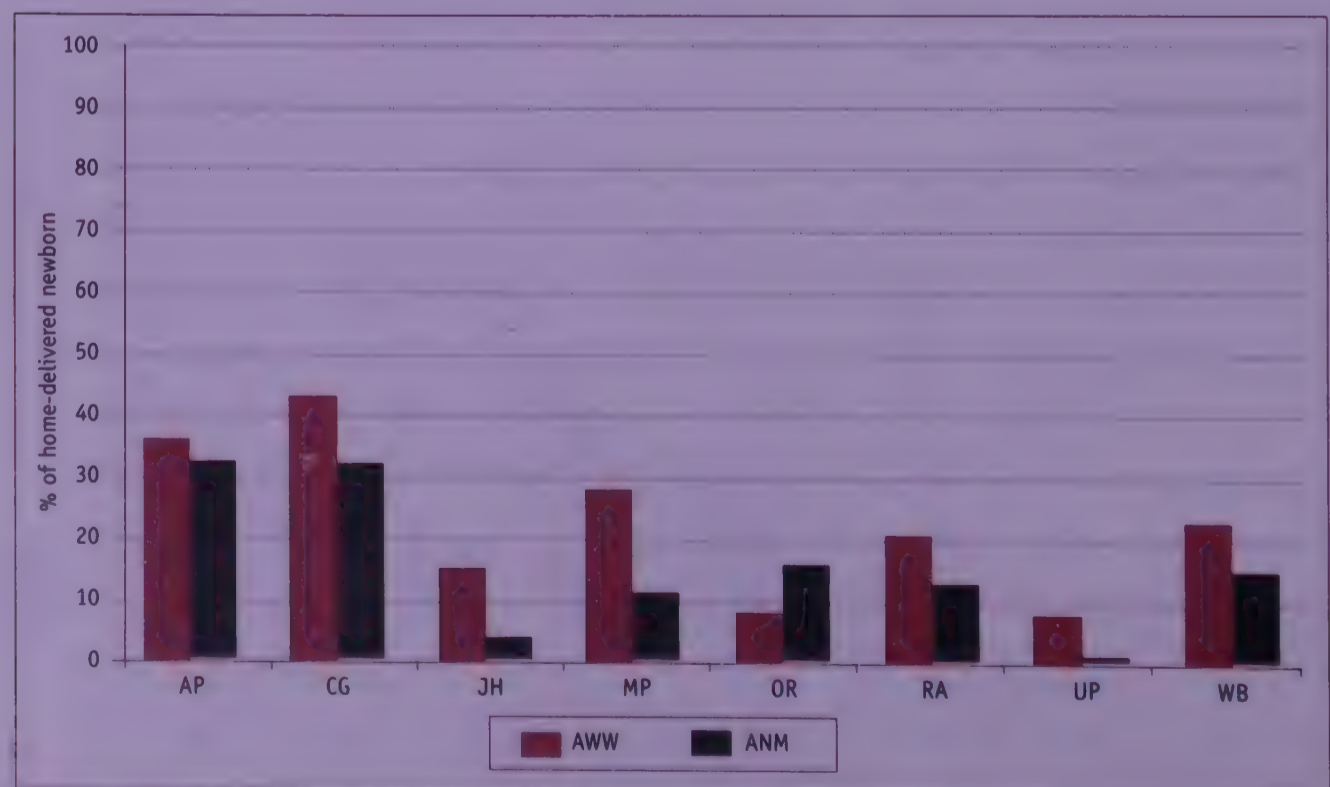
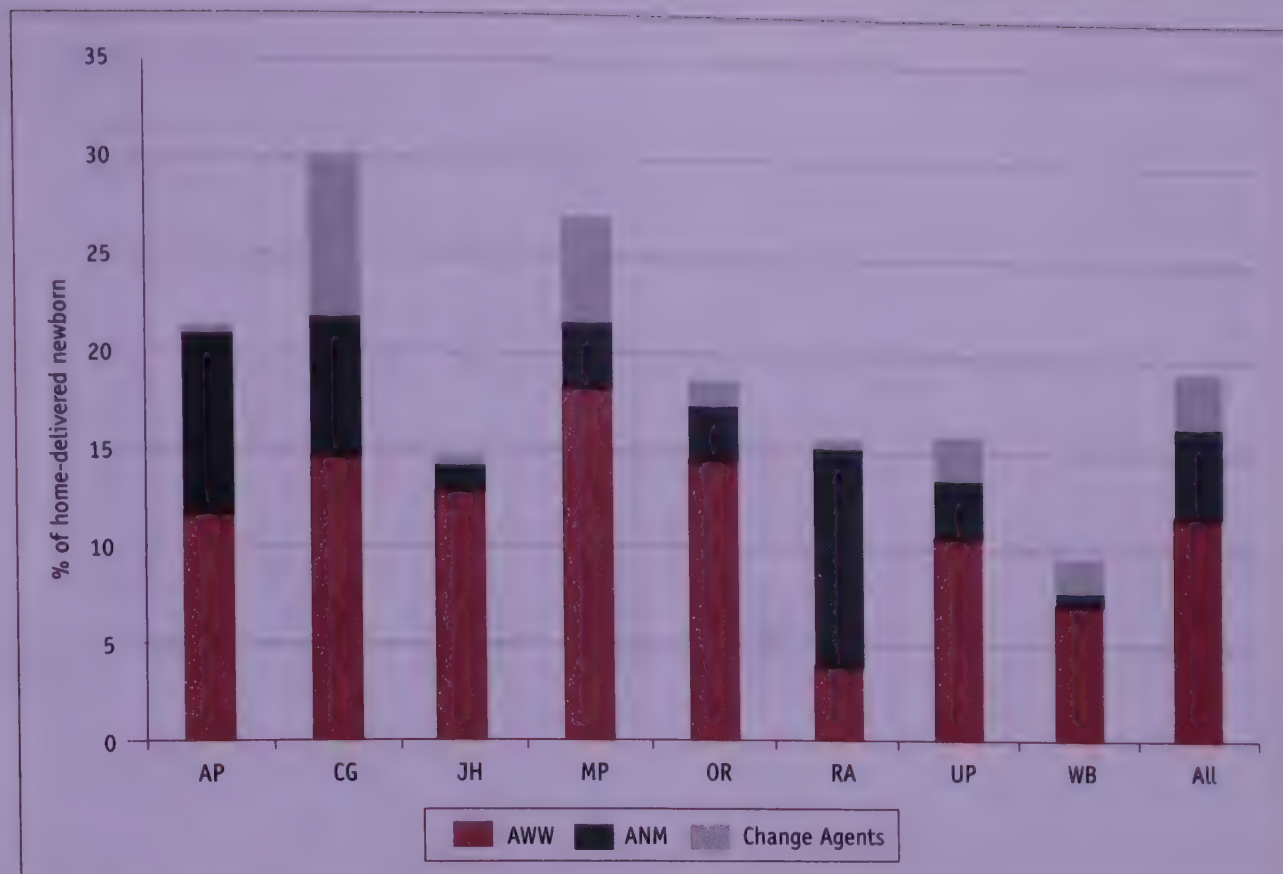


Figure 3.20: Proportion of mothers reporting home visit on the day of birth by either AWW alone or ANM alone or Change Agents alone, RACHNA Endline, 2006. Home delivered infants, 0-5 mothers old.



Overall, this represents a significant effort by the ICDS and RCH to improve newborn care, and illustrates the key role ICDS can play for newborn care. In our experience, the volunteers trained by the program (Change Agents) apparently contributed minimally in terms of reaching out to mothers unreached by the AWW or ANM.

Extra care for the weak newborn (Low Birth Weight (LBW), Pre-term)

In addition to trying to reach out to all families during the critical periods of late pregnancy and early neonatal life with relevant information and support for the care of the newborn, INHP also attempted to enhance the identification of babies at greater risk of death, and encourage more intensive care. Two kinds of cases at higher risk of death were envisaged: (a) newborn babies with sickness, possibly sepsis, who required immediate aggressive antibiotic treatment; and (b) newborn babies who were either LBW or born before full maturity, who required more intensive care to prevent sepsis and other complications.

The intervention promoted for the sick newborn was referral to the nearest facility that could treat neonatal sepsis. Because accessible facilities were absent in most district contexts, even the identification of such sick babies by outreach care providers was considered largely meaningless, and thus was not aggressively promoted.

Therefore, INHP promoted interventions for babies born weak (either LBW or premature) which included more intensive basic care such as increased attention to feeding, warmth and cleanliness at home as the most practical alternative to institutional care.^{vi} Data from the second and third rounds of the RAPs provide the proportion of mothers reporting that they were told by someone (a service provider or volunteer) that their baby was weak, and the proportion of those mothers reporting that they were told to provide intensive care to the baby. The proportion of home-delivered mothers reporting that they had been told that the baby was weak showed apparent increases in six of the eight panel districts, with the highest proportion (20 percent) in Orissa (Figure 3.21). Since “weak” babies

Figure 3.21: Proportion of mothers who reported being told that they had a weak/small baby, RAPs, Rounds 2 (2004) and 3 (2005). Infants 0-5 months old.



Not more than 40 percent births are likely to be LBW/Premature

were identified using a more liberal definition than the one proposed by the program, there is likely to be some over-diagnosis. Yet, this level of identification of the “weak” newborn babies is important for a large scale program setting.^{vii} Of those identified as weak, about 46 percent were told either to give more breastfeeds, or provide more warmth, or to pay more attention to cleanliness, but only 5 percent were told of all three, as recalled by the mothers. In all, less than 10 percent of such children were advised referral (data not shown). However, since the absolute number of babies identified as “weak” captured in these sample surveys is small, it is difficult to draw statistical inference from these figures.

Overall, data suggest that in most states, outreach workers were making significant efforts at least to identify LBW/premature babies and provide advice, and it should be possible to build on this and improve the quality of care.

The influence of background factors

Table 3.3 (page 23) examines the influence of two relevant background variables, socioeconomic status and the distance of home from the AWC, on the proportion of respondents receiving home visits during the last trimester or on the day of birth – since this has emerged as one of the key processes promoted by RACHNA that is associated with desirable newborn care practices.

As seen in Table 3.3, the Socioeconomic score⁹ does not appear to have had a consistent major impact on the receipt of home visits in any state: the poorer half was being reached by the workers as often as the less poor half.

The distance from the AWC was measured in terms of whether the AWC was in the same hamlet as the home of the respondent. Here, the expected association

⁹ Socioeconomic Score (SES): The variables included in the socioeconomic score are caste, maternal education, maternal employment, type of housing, access to toilet facilities, electricity and potable water. A score of zero or one was assigned to each respondent for each variable and the sum of these scores formed the SES score for a given respondent. The sample was split into approximately equal halves at a cut-off score closest to the median, to give two relative groups on either side of the median. This was done for each state, and separately for baseline and endline data sets. The method is described in greater detail in the paper, *Methods Used for Assessments*.

Table 3.3: Influence of selected non-program indicators on processes/outcomes, Endline Survey (2006)

Table 3.3: Influence of selected non-program indicators on processes/outcomes, Andhra Pradesh Survey (2009)																			
Indicator	Andhra Pradesh		Chhattisgarh		Jharkhand		Madhya Pradesh		Orissa		Rajasthan		Uttar Pradesh		West Bengal		All		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Proportion of mothers contacted in the last trimester or on the day of birth																			
SES	Low	153	87.6	350	66.9	335	58.5	290	50.7	322	56.2	216	31.9	233	56.7	140	46.4	2039	56.8
	High	52	80.8	227	74.4	166	58.4	125	66.4	243	65.4	258	41.5	234	64.5	256	46.9	1561	59.4
	Diff		6.8		-7.5		0.1		-15.7		-9.2		-9.6		-7.8		-0.5		-2.6
	OR		1.68		0.69		1.0		0.52		0.68		0.66		0.72		0.98		0.90
House in the same hamlet as AWC	No	10	50.0	64	65.6	93	40.9	39	38.5	183	53.6	74	23.0	59	35.6	171	42.1	693	44.4
	Yes	195	87.7	513	70.4	408	62.5	376	57.2	382	63.4	400	39.8	408	64.2	225	50.2	2907	61.2
	Diff		-37.7		-4.8		-21.6		-18.7		-9.8		-16.8		-28.6		-8.1		-16.8
	OR		7.13***		1.24		2.41***		2.14*		1.50*		2.21**		3.25***		1.39		1.97

is seen in six out of eight states: those staying in the same hamlet as the AWC report home visits more frequently than those staying in a different hamlet. It should be noted, however, that the proportion staying in a different hamlet is quite small in most states.

The Effect of Program Interventions on Neonatal and Infant Mortality

The only source of information on the effect of interventions on mortality is the newborn care evaluation research study in one program district of Uttar Pradesh. Using a quasi-experimental design, including pre-post assessments in Barabanki and a non-intervention district (Unnao), the study attempted to measure the impact of INHP interventions on neonatal mortality rates. The assessments included baseline and endline surveys of large samples of recently delivered women, including mortality estimations, as well as periodic “adequacy” surveys designed to measure process indicators to inform the program about adequacy of intervention reach. The study was thus a large scale effectiveness trial of a “minimalist” package of newborn care services, a first of its kind.

A detailed report on the study is available from the group which conducted the assessments (JHBSPH, 2006). In summary, the study found virtually no difference in the neonatal mortality rates between the intervention and comparison districts over about three years, and concluded that the package of services that it was designed to test could not be expected to cause measurable reductions in neonatal mortality, since the interventions that made up the package did not effectively address the three main causes of neonatal death – prematurity/LBW, infections including sepsis and asphyxia. The following observations were specifically made:

- It is unclear whether pre-term or low birth weight newborns received extra care at the household level.
- Case management of pneumonia and sepsis, which would have had the greatest effect on mortality, was not a part of the package, and the level of knowledge of service providers about danger signs was low, suggesting that referral for serious complications was low.
- Birth asphyxia was not specifically targeted.

The report, however, also notes that family care (clean home delivery, hygienic cord care, thermal care and breastfeeding promotion), included in the intervention package, could be expected to reduce neonatal mortality by 20-50 percent if coverage approached 80 percent or higher. Implicitly, since such coverage was not achieved, mortality reductions were not seen.

The report also notes that there were differences in the findings of the adequacy surveys (which consistently showed that there was little change in several desirable newborn care practices over consecutive surveys and that these levels remained close to baseline levels even at the last adequacy survey about six months before the endline survey) and the endline survey of the assessment (which showed large increases in reported behaviors compared to the baseline).



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The report speculates that the plausible reason for this discrepancy is that, as more mothers were exposed to the desirability of certain newborn care practices as intervention progressed over time, they erroneously reported these in the endline survey as if they had actually followed these correct practices, and that the endline therefore overstates the magnitude of improvement of such practices.

While interpreting the results of this study and its conclusions, it is important to bear in mind the following:

- There was well-documented variation across districts in the pace of change in indicators. For instance, the rate of improvement in estimates of many indicators in the INHP district (Rae Bareli) that was adjacent to the study district (Barabanki) was greater as compared to the study district. As noted earlier, some other INHP districts showed even larger improvements than Rae Bareli while others showed almost no improvements over time. Such differences from district to district appeared to be due to differences in the focus and intensity of the respective CARE district teams and the responsiveness of the district ICDS and health program managers. Both varied considerably across the program. Thus, the study district cannot be taken as representative of what happened in the program as a whole.
- A significant portion of the improvements in indicators seen in the INHP districts happened in the last year of the program, and thus the large increases seen towards the end of the study in Barabanki were not exceptional or unexpected. In addition to the reasons suggested in the report, there might well have been a genuine spurt in improved practices in the last months.
- The late spurt in improved practices in the last few months was clearly insufficient to impact mortality as measured over the two years of the study.
- This large-scale program was never designed to include the management of sepsis and asphyxia. Scalable community interventions for these were not available when the program was launched, or for much later thereafter. Even now, the scalability of model programs is in debate. As discussed in an earlier section, the identification of LBW/premature and their intensive home management improved over time, but clearly did not reach the level of intensity needed to achieve impact. There is nothing to indicate, however, that better coverage of care cannot be achieved at scale.
- Referral care for any of these conditions was not possible in most contexts simply because there were no appropriate institutions to refer to, and it was well beyond the scope of the program to strengthen institutions.

Improving Newborn Care Practices: Strategy Lessons from INHP-II

The context

By the time INHP-II was launched in 2002, it had become clear that infant mortality could not be substantially reduced without addressing neonatal mortality. In addition, it had also become clear that neonatal mortality in the developing country context, and particularly in the Indian context, was largely due to three causes: infections/sepsis, birth asphyxia and prematurity,

aggravated by neonatal malnutrition/LBW. The path-breaking study from SEARCH (Bang et al, 1999) had shown that substantial reductions in neonatal mortality could be achieved through aggressive community based interventions, based on the premise that institutional care in a remote rural context in India was an impractical proposition. Other initiatives were being considered to test the SEARCH model more widely, and other models were also being tested. A large amount of analysis and refinement of concepts occurred globally while INHP-II was being implemented, exemplified by the Lancet Child Survival and Neonatal Survival series, but these were available after INHP-II was designed. From the past, two old studies (Pratinidhi et al, 1986, Daga et al, 1989) had shown promise of modest reduction of neonatal mortality through preventive interventions, including home-based newborn care, mainly through the prevention of infection, particularly in the LBW/premature babies. The RCH program (and the CSSM before that) had long incorporated essential newborn care in the training of ANMs, but with unclear results. The ICDS program was committed to maternal care and to reduce infant mortality, but had not seriously considered involving itself in neonatal care. Neither the private nor the public sector had institutions that could provide credible neonatal institutional care to more than a small fraction of the nation. In this context, INHP-II committed itself to help ICDS and RCH to reduce infant mortality, primarily through a focus on neonatal mortality at a scale of about 100 million population in eight of the most needy states of India, in which the majority of births were still happening at home, and where there was no immediate hope of this changing substantively during the five year life of the project.

Choosing interventions and strategies

INHP-II had consciously chosen to promote an integrated set of proven preventive interventions, including elements of maternal care, child nutrition and immunization, besides newborn care, and to work through existing public health delivery systems and communities to achieve this. One of the immediate challenges was the choice of specific interventions to promote to address neonatal mortality: the package had to have a reasonable chance of producing impact, and be scalable. The related challenge was to find a mechanism that would deliver this package at a fast pace to a very large and diverse population. As described in the papers *Program Description* and *Changing Infant and Child Feeding Behaviors*, INHP-II began with an elaborate operational strategy, which evolved as experience and learning grew. The evolution of the strategy had also to account for the fact that, by design, the project would expand its scope of influence to reach about half the project area by the 4th year of the project life, leaving about just more than one year to achieve results at scale before the final evaluation.

After examining available evidence, INHP opted for a set of interventions which included everything that a family could do to maximize survival, and addressed newborn care as a behavior change intervention.^{viii} Since everything hinged on getting crucial information to the family about newborn care in a timely manner, establishing a reliable delivery mechanism of effective interpersonal communication was a priority. This could be supplemented by other multi-channel mass communication efforts.

Evolving robust strategies

Dais (traditional birth attendants) were an obvious option for being a vehicle for interpersonal communication. From the outset, however, it became obvious that the project did not have the time and resources needed to intensively engage TBAs. Thus, while TBAs were addressed, they were not a major focus of the project strategies. Since ANMs and AWWs, the frontline workers on ICDS and RCH, were seen to be overloaded, the project opted for recruiting and training large numbers of community volunteers, who would have the additional advantage of being an interface between the services and the communities. The experiences with community volunteers and other community groups are described in greater detail in other papers in this series. However, by the time these strategies were scaled up during the five year project, it became clear that volunteers were not contributing significantly to what the AWW and ANM were doing in terms of visiting homes and prompting behavior change.

This led to a rethinking of the strategy, and thereafter, AWW, ANM and their supervisors were approached more methodically, to help them focus on tasks related to newborn care within their available work time. In essence, the idea was to ensure that the family of every pregnant woman was visited at least twice late in pregnancy to help prepare for birth and immediate newborn care at home, followed by a visit at the earliest possible after birth. The presence of the AWW or ANM (or volunteer) at the time of birth was preferred, failing which the family was to be visited on the same day, to ensure that practices related to thermal care, hygiene and breastfeeding were carefully followed, and that any LBW/premature neonate (“weak” baby) was detected early and cared for. Revisits during the first week and in the subsequent weeks were also promoted, with “weak” babies being visited as frequently as required, depending on how well or badly the baby sustained breastfeeding.

Since an average AWC covered about 1,000 people, and there would be about 20-40 births in the average year in different states, this meant 100-200 home visits related to antenatal and newborn care per year for an AWW, supplemented by as many home visits as an ANM could make when she visited a village (typically, once or twice a month). About 10-20 percent of births (the “weak” babies) would need more frequent attention.¹⁰ Adding on similar home visits needed to promote infant feeding and immunization in later infancy, the number came to about one to two home visits per working day per AWW, which was well within the prescribed five per day norm for the AWW, and thus feasible. Once it was clear that this was essentially a reorganization of field work and not an additional burden, it was accepted in most places.

Building accountability, capacities and tools

This strategy, which crystallized to a certain extent only in the last year of the project, depended on the consistency of timely interpersonal communication

¹⁰ About 30-40 percent of all babies at birth in India are expected to weigh less than 2,500 grams. However, considering the available evidence on higher risk of death, expert advice and the practicalities at large scale, INHP chose to define “weak” newborn requiring greater care as neonates having one of the following characteristics: birth weight less than 2,000 grams, birth occurring one month or more before the expected date, a newborn who does not feed strongly at the breast from the outset. However, it was difficult to verify how widely these criteria were used in practice.

between frontline workers and families of pregnant women and neonates, something that was widely perceived at the outset as impractical and not feasible. A number of processes were strengthened to try and ensure this:

- The daily diary of the AWW was restructured to make it a simple home-visit-planner-register, which reminded AWW to track individual pregnant women and children.
- The monthly sector meetings of ICDS, where the supervisor met all her 20-30 AWWs, was restructured to afford about two hours or more of time in every meeting to discuss substantive issues related to behavior change and service delivery (besides routine reporting and other administrative issues that typically took up most of the time). In states like Uttar Pradesh, where two sector meetings took place monthly, one meeting was structured in this manner. The discussion was sought to be structured using questionnaire guidelines, and either local NGO staff (about one per block) or RACHNA district team members helped supervisors facilitate such discussions for several months until the supervisors became comfortable doing it themselves. These discussion sessions were the mainstay of ongoing capacity building for both the supervisors and the AWW (and, for that matter, the facilitators). The effort was also to have the relevant ANM attend these meetings, making a close coordination between the two departments possible.
- The ICDS supervisors were provided checklists (questionnaire guidelines) to help them use the time available during village visits (typically, 7-10 per month, in practice) to focus on those aspects of the AWW's work that were most likely to impact neonatal and infant caring/feeding practices.

The actual size and content of these tools and processes were based on generic versions produced for the whole program, but varied across districts in terms of the final versions used. This variation was allowed by design, to maximize the involvement of local leadership and their ownership of what was in essence a problem-seeking, problem-solving approach to implementing a set of simple interventions.

Most states incorporated some kind of simple but minimal, formal or informal reporting elements for supervisors, to help CDPOs monitor the program (facilitated by CDPOs).

The effort thus was to maximize internal accountability for the performance of simple tasks and the sustenance of focus on long-neglected areas of behavior change and improving service coverage, primarily by asking right questions during supervisory interactions within ICDS at block levels and below.

It was envisaged that these tools and processes would be refined, district by district (and at smaller units of implementation if need be) over time, informed by the feedback on their effectiveness in moving the most critical outputs (such as home visits) and outcomes (such as behaviors). It was also envisaged that, over time, this process of causal thinking and refinement of the program on an

ongoing basis will become the fully owned responsibility of the ICDS and RCH program leadership. However, INHP-II did not have sufficient time before its final evaluation to methodically move to these stages, and these are now major agenda items for the next phase of INHP.

Structured class room training, which had been extensively used in the earlier years of INHP-II, was used only sparingly during the last year (mainly for training ICDS supervisors in some states), the bulk of the capacity building effort being less formal and more responsive, using available opportunities such as sector meetings, as mentioned above.

In practice, and as can be expected in a program of this size in the early phase of implementation of a strategy of this nature, there was wide variation in the intensity, content and quality of these processes. From close observations and interactions of the authors of this paper with field personnel of CARE and the ICDS and RCH programs in many states, it appears that such variation was closely associated with corresponding variation in outcomes. An independent qualitative assessment of some of these tools and processes in 2007 (Bongiovanni A, et al. 2007) supports this conjecture.

Conclusions

INHP-II attempted to reduce neonatal mortality in a large population of over 100 million people between 2001 and 2006, something that had not been accomplished other than in closely supervised, intensive programs using aggressive interventions on a comparatively miniscule scale.

As discussed at various points in the course of the paper, there are good reasons to believe that INHP-II succeeded, at program scale, in the beginning to move up several outcome indicators related to newborn health in a manner predicted by the strategies it adopted. This varied across districts, but each district was of sufficiently large scale to be relevant. The levels or the rates of change in the levels of key indicators in areas supported by INHP-II areas was greater than in non-INHP supported areas. Also, close associations were found between INHP-promoted strategies (such as providing home visits and advice) and these key indicators.

The expected modest effect on mortality from the wide implementation of the simple family-based interventions was not seen in the one district in which it was measured. There is no evidence to say whether a reduction in neonatal mortality was achieved in other districts. It is tempting to believe that mortality was impacted in at least some districts where the rate of change in estimates of outcome variables was rapid, of the order of magnitude of 20 to 40 percentage points or greater in the last year or so of the program. Nowhere in the program (from the evidence available) were universal levels achieved for any of the key home-based caring practices, and thus it is fair to say that the neonatal mortality impact was almost certainly not the 20 percent or greater predicted in recent reviews of evidence for the potential impact of such interventions. However, lesser levels of impact cannot be ruled out.

Does the apparent failure to demonstrate measured change in mortality make the INHP experience irrelevant? Much to the contrary, the experience has shown what is immediately achievable through existing programs at full scale, and what strategies are likely to yield such results at affordable cost:

- Until more effective institutional care for premature/LBW neonates and neonates with serious infections is available, existing programs can reach out to families of pregnant women and neonates in a timely manner and optimize the home-based care of the neonates.
- Of these programs, the ICDS, because of the presence of an AWW in each village, and because of a supervisory structure that is functional in large parts of most states, can contribute substantially. Reducing infant mortality has always been a mandate for ICDS, and the program has been criticized for not doing enough. The INHP-II experience has shown that, given a relatively minor reorganization of the work of the AWW and the supervisor so that critical tasks get the attention they deserve, ICDS can indeed play an effective role in reaching individual families with life saving information and support.
- The processes used in INHP-II to promote such interventions through ICDS appear feasible, and can be refined over time.
- While INHP-II has not exploited the potential of the role of the ANM and the RCH program as it has the ICDS program, the readiness of the frontline functionaries to coordinate their efforts closely is promising. The experience also indicates that focus-and-accountability enhancing strategies for the RCH program/health system, similar to those used for ICDS, can increase the effectiveness of ANMs further. If this can indeed be achieved, ANMs have the potential, in tandem with AWW, of taking technologically more challenging interventions such as the management of sepsis and asphyxia, to a significant proportion of the population.

In many ways, the single major achievement of INHP-II in the field of newborn care has been in bringing home-based neonatal care into the daily operational focus of the ICDS and RCH in its project area. In these 78 districts, reaching out with essential newborn care interventions to families of neonates in a timely manner has been accepted by the ICDS and RCH programs as normative, necessary and feasible – a practical solution offered to the national debate about how to reach out to neonates in remote corners of the country. Interventions that are more aggressive and effective can be introduced through the same or similar delivery mechanisms. However, until such interventions can be effectively introduced, simply optimizing the INHP-II approach, primarily of strengthening the focus on effective interventions through ongoing capacity building and through strengthening internal accountability mechanisms of existing systems, can potentially save millions of neonatal lives. As assessments made during INHP-II showed, the practice of even simple caring and feeding behaviors was shockingly low as recently as two to three years ago in many of the states. These practices are widely acknowledged to be integral to any “package” of neonatal care interventions, and the INHP-II experience has shown that these can be changed without major additional cost or policy change.^{ix,x}

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Endnotes

- i The emphasis in the program was for the use of a new blade, not a boiled blade. Anecdotal observations indicate that, in practice, there was in many places the practice of "cleaning" the blade in warm water before use, even when the blade used was freshly removed from the original wrapper. Such "cleaning" appears to rarely amount to rigorous boiling, and thus is probably more detrimental than using a fresh blade without any cleaning. In the case of "clean thread", the material used was usually new (as a piece of string from a reel of thread), but rarely boiled before use. Since chances of contamination of blade and thread after boiling are high, it was considered better to promote the use of fresh blade and unused thread (or the use of materials from a disposable delivery or cord kit, where available) rather than promote boiling and risk contamination. The way this was actually promoted varied slightly across different areas, influenced both by tradition and the practices within local medical/health systems.
- ii In the RAPs in the panel districts, respondents were asked about the kind of substance applied to the cord stump or umbilicus, providing options of "blue medicine (gentian violet)", "powder", "oil", and "others". In the third round of RAPs (late 2005), in the three districts (of Madhya Pradesh, Rajasthan, Uttar Pradesh) where a large proportion reported that they did apply something, the substances applied were different. In Rajasthan (Bikaner district), it was

mainly “others”. In Uttar Pradesh (Rae Bareli district), oil was applied to the cord stump as well as to the cord until it fell off, and then a smaller proportion of families reported applied powder to the umbilicus after the cord fell off. In Madhya Pradesh (Seoni district), both oil and “others” were applied to the cord, and a small proportion reported applying “others” to the umbilicus after the cord fell off. Evidently, these practices are being driven by different local beliefs, which need to be explored and addressed. Interestingly, these three states (Madhya Pradesh, Rajasthan, Uttar Pradesh) reported the highest rates of applying anything to the cord in the endline survey as well - about 30 percent or more women reported that something had been applied to the cord stump at birth.

- iii In surveys, the time of initiation of breastfeeding after birth is inherently difficult to precisely estimate. When measured in hours, it assumes a clear sense among respondents of what constitutes one hour. Further, there seems to be a significant tendency among mothers to say “one hour” when asked this question, presumably mirroring the advice they have received (and which may convey their intention rather than actual practice). It becomes necessary to probe further to know whether they mean “within one hour” or “after one hour”, and code the response carefully. In surveys that have a large number of questions, it may not be possible to consistently ensure this. Finally, it is not clear whether there is value, in terms of neonatal outcomes, to try and make out this difference between whether the child was first put to the breast within one hour or within two hours. Thus, it probably makes more sense to estimate whether the child was first put to the breast within two hours of birth. Other surveys such as the CES also use this “within two hours” indicator. Other methods of measurement of how early on the first day the first feed was given, which rely on natural milestones, need to be tested and validated.
- iv This decision – to speak only of early breastfeeding and not of feeding colostrums – was taken following extensive observations that indicated that the practice of squeezing out colostrums, wherever practiced, was almost inevitably limited to rejecting a few drops of the milk, at the most. This loss was not considered significant enough to attempt change in behavior at large scale. The separate emphasis on colostrums was also leading to the misunderstanding that delay in initiation of breast milk was equivalent to losing colostrums, unduly complicating the “message”. While the importance of colostrums is emphasized in the program, such as during training of workers, this is neither a separate “message” in the program, nor is its practice measured. In the field, however, variations may remain in the extent to which this is understood.
- v The most likely explanation seems to lie in the difference between the question wording in the three surveys – while CES and RACHNA use the phrase “antenatal check-up”, NFHS uses the phrase “antenatal care”, and the question about how many times antenatal care was received is preceded questions about where antenatal care was provided, which includes home. This could well have led women to consider to any contact with any service provider during pregnancy as “antenatal care” and count these in on the “how many times” question. The CES and RACHNA endline questions are very similar and probably directly comparable.
- vi The questions in the CES and RACHNA tools for iron are also fairly comparable, but the recording is a little different: while the exact number of tablets is recorded by the RACHNA tool, CES records in three categories – 30 or less, 30-89 and more than 90. In addition, there is another provision for recording the approximate proportion of tablets consumed for those who do not remember the exact number of tablets consumed. It is not clear from the report how the latter cases were handled in generating estimates. The NFHS-3 questionnaire asks about how many days rather than how many tablets, but this may still be roughly comparable considering that most women consume not more than one tablet a day.
- vii Since measurement of birth weight was uncommon, and records of the last menstrual period not expected to be accurate, developing a scientifically “acceptable” definition for the identification of low-birth weight or premature birth was a challenge. From other studies it had been clear that the highest salvage was expected to be in the case of babies born either moderately preterm (33-37 weeks) or very (but not extremely) low birth weight (between about 1,500 and 2,000 grams at birth), whereas the survival rates for babies born heavier than this at full term was expected to be relatively high even

without extra care. Therefore, a simple case definition was developed for the identification of the “weak” baby requiring more intensive care at birth: a birth weight less than 2,000 grams (if measured), or born more than a month before the expected date of delivery (if estimated and known), or feeding weakly at the breast from the day of birth (as the most relevant clinical indicator, universally recognizable). If any one of these three criteria were present, it was considered sufficient to make a diagnosis of a “weak” baby, and initiate more intensive basic care. It was expected, on the basis of estimates from community studies, that about 20 percent of all births would qualify to be “weak”. In practice, it is not clear how uniformly these criteria were applied, and with what sensitivity. Over time, it was clear that a less rigorous case definition – a baby that appears too small at birth – was also used quite commonly in practice.

- viii An examination of the patterns of birth weight as reported by mothers shows that birth weight is associated with the identification of babies as “weak”. Program wide (at the endline), a baby with a reported birth weight of less than 2,000 grams had a 3.3 times greater chance of being identified as “weak” than a larger baby; similarly, a baby with a reported birth weight of less than 2,500 grams had a 2.4 times greater chance of being identified as “weak” than a larger baby. However, less than a third of those identified as “weak” reported a birth weight less than 2,000 grams. Also, just 33 percent of all women who delivered at home (ranging from about 6 percent in Rajasthan to 62 percent in Andhra Pradesh) could report a plausible birth weight measured within 10 days of birth. This may simply indicate that criteria other than weight are being used for the identification of a “weak” newborn.
- ix As described in the first section of this paper, most of the focus interventions were dependent on the family adopting health caring practices, starting with the family getting mentally and materially prepared for immediate newborn care after birth, and then actually practicing appropriate thermal care, cleanliness and breastfeeding interventions. The early recognition and extra care at home for LBW/premature babies was also promoted. Tetanus toxoid coverage rates were already fairly high at the baseline, and while the achievement of higher coverage was promoted by INHP, this was unlikely to lead to major additional salvage of neonates. An attempt was also made to enhance the quality of antenatal check-ups, but it was clear from the outset that the consistently high quality of antenatal care needed to make a difference to neonatal outcomes was very difficult to achieve in the field.
- x The cost of the INHP-II approach has been worked out and is presented in another paper in this series, *An Activity-based Cost Analysis of the CARE India RACHNA Program* (Fiedler J, 2006). The actual operational cost of implementing a catalytic program of the intensity of INHP-II is a small fraction of recurrent cost of the ICDS and RCH programs in any district. This potentially represents substantial value for money since it leverages the current programs to make them more efficient and effective.

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large increases in home visits made by service providers. The newborn evaluation research study, however, found that neonatal mortality rates did not change over time in either the intervention district or the comparison district, and its report speculated that this could be because, despite increases, the levels of practice of newborn care behaviors did not reach near-universal levels, and because the program did not implement interventions for the management of neonatal sepsis and birth asphyxia. Mortality data was not collected from other program areas and hence it is not possible to definitively conclude on the impact of the program on neonatal mortality across all program areas, including those districts which showed substantial improvements in newborn care practices over time.

The rapid improvements in newborn care practices in most of the program states appear attributable to improved system performance, especially of the ICDS program, strongly suggesting that existing systems of delivering public health can make a substantial difference to neonatal care and survival, using strategies that bring their efforts to focus on interventions that can be practised at home. Enhancement of the intervention package to include the management of sepsis and asphyxia should further increase effectiveness.

This series of working papers was envisioned and written by persons actively involved in the program design and implementation. USAID/BASICS directly contributed to the writing and production of this series of papers in several ways before it closed in India in December 2007. A number of data support and field staff gave invaluable contributions, and the papers were reviewed by CARE-India and USAID/India staff.

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About RACHNA

Two major projects of the Reproductive and Child Health, Nutrition and HIV/AIDS (RACHNA) program of CARE-India completed five years of work supported by funds from USAID in late 2006. The second phase of Integrated Nutrition and Health Project (INHP-II) was aimed at helping reduce child malnutrition and mortality. The rural component of the *Chayan* project primarily addressed the unmet need for spacing methods, while its urban component attempted to reduce HIV transmission among at-risk groups. Together, the projects covered 78 districts and 22 cities, spread over 10 states, and worked closely with key national programs and a spectrum of different partners. This series of working papers documents the results and lessons from these five years.

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